# Commodore HORIZONS

**The independent Commodore magazine**

75p February 1984

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The independent Commodore magazine

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*Commodore Horizons* welcomes readers' contributions — either articles or program listings. Articles should be typed double-spaced with a wide margin. Programs should, whenever possible, be printed out on plain white paper, accompanied by a cassette. We cannot guarantee to return every article or program submitted, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

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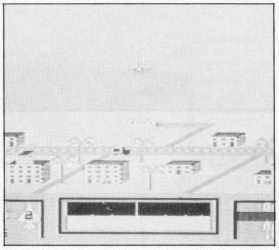

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## EDITORIAL

OUR CAMPAIGN TO persuade more independent companies to produce Commodore software certainly struck a chord with many of our readers. But keep your letters coming in — the more people who write to support us, the more pressure we can put on the software houses. And the higher number of potential purchasers we can point to, the more attractive will the proposition seem to software houses.

As we pointed out in our first issue there are very few firms producing Commodore software — particularly compared to the hundreds of small, innovative software firms producing original material for the Spectrum. We think it is time that those firms started producing software for the Commodore range of machines. If you agree, then why not join us in our campaign to persuade Spectrum software houses to start writing for the Vic 20 and CBM 64?

Response to the launch of the campaign in our first issue was strong, with only one person dissenting. This reader thought there was no need for the campaign, and that we should instead be supporting those companies who have already put time and investment into writing Commodore software. We have no intention of ignoring those companies — in each issue we'll be reviewing the latest software available and in our news we'll be trying to give readers an idea of what there is to look forward to. But we're not convinced by this reader's arguments, and the rest of the letters received so far support us. The point made by most readers was that their machines were superb but the range of software available was not. To pick one response at random: "What ought to be done is for someone to adopt a more positive attitude to the extensive potential of the 64. I therefore support your presentations to software houses to increase and vary software availability." And another: "On reviewing the software available, I find myself in total agreement with your editorial. Despite its potential the 64 would appear to be inadequately serviced by the software houses."

This reader added: "There are relatively few games available and virtually no educational software. So, please, more educational software for pre-O-level, and some software — any — in the shops." In fact the most common cry was for educational software, although there also seems to be a need for small business programs. Some requests were very specific — one "ardent user" is especially keen to get a good version of Scrabble. Whatever your needs, if you want more firms to produce software for the Vic 20 and CBM 64, write to us and let us know — we'll make sure your views are heard.

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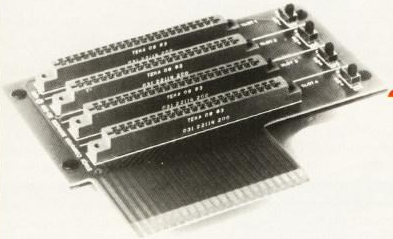

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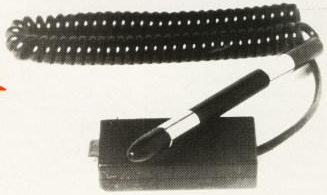

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# LETTERS PAGE

## Competition cornered

IN response to the insoluble problem in your Competition Corner, may I offer the following comment:
Five micros, leads, owners and screens,
Five programs giving wondrous scenes,
A floppy drive worth several quid
To give incentive to a bid
To solve a puzzle, what goes where
Who owns the joystick by the chair?
And who it is that cannot see
Their program on twenty-inch TV?

Each has a peripheral, *only one,*
To make their program lots of fun,
A joystick, voice box, printer, pen
That's four, so now let's think again,
A floppy-reader, there that's five!
So who brought in that cassette drive?
This extra gadget brings to six
Attachments we can add to Vics.

Master Roberts, problem-setter,
Thought he'd make the puzzle better,
Than anyone with any nous,
Or even Apple, Lisa, and mouse,
Could solve to win a high speed store.
He must be saving Commodore
The pain of having to donate
A fast magnetic storage plate.

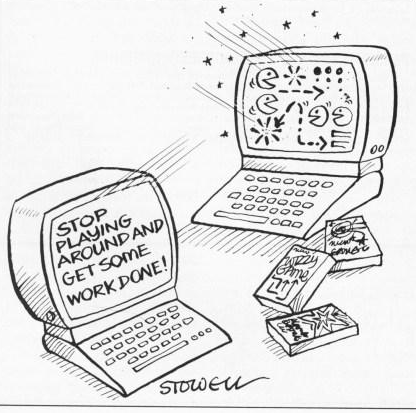
This prize is not a give-away;
Two hundred quid is what you'll pay,
Plus seventy-five pence if you are won
By magazines who egg you on
To purchase them, with covers stating:
"Win a prize if you are waiting
Til the day you've saved the sum
To buy your fifteen-fortyone".

If puzzles set in Club Hell Nook
Are featured often in your book,
There's only one more thing to say:
"Purchase you? Hell No! O.K.?"
*John Carter*
*Maidstone*
*Kent*

**THE competition certainly caused a lot of problems (partly due to our mixing up disks and cassettes) — we promise to sort things out at Club Hell Nook from now on.**

**One reader suggested that the joystick belongs "to Henrietta, who left it there last week, and it was not noticed among all the mess. She needed it for her BBC micro but was ill this week." Nice try, but wrong answer.**

**A lot of people, however, have got it right so far, and we'll announce the winners and the answer next month. In the meantime we'll try to think of an alternative prize for John's entry.**




## Slick Vic tricks

CONGRATULATIONS on producing a first-class issue. It is the first time I have found a magazine with programs using the Super Expander Pack on the Vic 20. It would be nice to see more.

Both routines on page 43 worked first time, quite encouraging after so many other magazine programs resulting in ERROR IN, etc.

Also both short programs produce interesting effects if Graphic 2 is changed to Graphic 1 or 3. Simple programs but great fun. They kept my son and I amused for a whole Sunday afternoon.
*Christopher Holby*
*New Milton*
*Hampshire*

## Chestnuts repeated

THE Minefield program in the first issue of *Commodore Horizons* works well, but some points made in the last item of Old Chestnuts Roasted need clarification.

Using shift & RUN STOP to load a program results in the program being automatically run after it is loaded. LOAD (return) does not.

And programs to make the keys of the Vic repeat are unnecessary, because POKE 650,255 will make all keys repeat. (POKE 650,0 will return to normal — RUN STOP/RESTORE will not.)

Keep up the good work with the magazine.
*J M Dunnett*
*Prestatyn*
*Clwyd*

## Vicsoft vexations

AS A newcomer my overall impression of *Commodore Horizons* was favourable.

Some of the listings were very good, for example Apple Fall which was easy to follow although it would have been helpful to have notes on the number of spaces in certain lines.

On the other hand the listing for Go into Space was very poor, with the control codes being practically impossible to read.

You may be interested to know of my problems with Vicsoft. I telephoned to order some software on the 11th October. The goods were confirmed in stock and my Access card was debited on the 13th October. Despite numerous phone calls to find out what had happened only part of the goods arrived on 8th November. I have complained to Access about the charging of cards without despatch of goods and I understand that this is contrary to instructions.

To my mind the choice of computers at the moment is between the Spectrum, BBC B and CBM 64. The BBC costs too much. The Spectrum has a lousy keyboard and no sound out of the television, but lots of good programs. The Commodore was my choice despite the poor Basic — though if you get to grips with it you can probably manage anything.
*D A Welford*
*Ongar*
*Essex*

**POINT taken about the listings — and let us know if Commodore still doesn't take the point about Vicsoft.**

## Take a tip

HERE'S some tips for Commodore 64 owners:
POKE 808,239 disables run/step and POKE 808,237 re-enables it.
POKE 775,200 disables the list command and POKE 775, 167 re-enables it.
*Patrick Folan*
*Barnsley*
*South Yorks*

**This is the chance to air your views — send your tips, complaints and compliments to Letters Page, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD**

Why put up with second best when we can offer you a real choice of software for your Commodore 64? Here are some of the 250 + GAMES:

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# software

The software lists show, in order: the product **name/producer/price prefix** (to indicate cartridge:<r> disk:<d> and no prefix for cassette. Producers are abbreviated (SSFT: Supersoft) for identification, and help to identify like-named products for price checking or ordering. The product types where differing slightly from others in the same grouping are: **ass(3)(u):** three-pass assembler(+utilities) **comp:** compiler **dbu:** database (code) writer **intf:** interfac **madv:** mystery adventure **mon(a)(u):** monitor(+assembler)(+utilities) **pred:** programming tutorial **prog:** programming utility **sadv:** space adventure **stat:** statistics **txed:** textediter **wpt:** wordprocessing + terminal software **wpu:** wordprocessing utility or link program.

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**NEWS DESK**

## Following up Falcon

STEVEN LEE, 24-year-old author of Falcon Patrol for the Commodore 64, is now planning his next game.

Provisionally called Hideous Bill it will be released by Virgin Games at the end of January. In it you, as the Hideous Bill of the title, must fight off a succession of attacks from unfriendly ants.

Steve is also working on a follow-up to Falcon Patrol — predictably Falcon Patrol 2. Using the basics of the original but with added features and a new more difficult location, the game is predicted to be tricky.

# Speech built into new 364

THIS summer sees the launch of a new Commodore home computer with built-in speech, the 364 — and lower cost versions may follow later.

As well as built-in speech, the 364 will offer 32K of system ROM, 64K of bank-switchable RAM, luminescence control and a redesigned keyboard plus numeric keypad.

The system is said to be "very flexible making it easy to produce lower cost versions!". For example, cutting down on the RAM and dropping the speech module could produce a 232 or 116.

The good news is that the 364's ROM offers all the Vic Super Expander commands. The bad news is that there are no sprites, and that Vic and 64 software will not run on the new machine.

The 364 uses Basic 4. This is the version of Basic used on Commodore's business machines, as opposed to Basic 2 on the Vic and the 64.

The new micro was shown for the first time at the Consumer Electronics Show in Las Vegas at the beginning of January — running a talking version of Easyscript.

It is expected to go into UK production this Easter.

# On the serious side of software

COMPANIES both large and small are being attracted by the market for software with serious applications — programs for use in business and in the laboratory.

Stourbridge-based Specific Software has released a suite of book-keeping programs for the Vic and 64, while chemicals giant ICI is aiming for scientific users of Pets and 64s.

Specific Software's suite of programs covers Invoicing, Sales Accounts and Purchase Accounts. Each is available on either tape or disk for both the 64 and a Vic 20 plus 16K RAM, although the capacity and range of facilities vary accordingly.

For example the tape-based version of Sales Accounts for the Vic does not include address label printing which is available on tape for the 64 and on disk for both machines.

Prices also vary accordingly — so Sales on tape for the Vic costs £25.00, but rises to £100 for Vic disks. The 64 tape version is £75.00, rising to £120.00 on disk — this includes extra facilities such as cash analysis headings.

Purchase Accounts has the same price structure but the Invoicing package costs from £20.00 to £45.00.

The tape versions have a capacity of 60 accounts and 300 transactions, while the disks offer 300 accounts and up to 2,000 transactions.

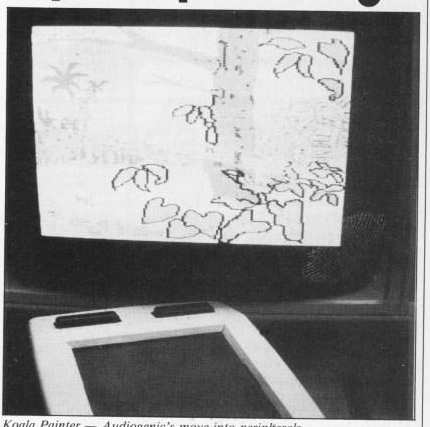
ICI's three packages (Tomult, RSP and Droptest) are being marketed under the Rexagan title already used for its input/output interfaces. Pet versions are available now, but 64 users have to wait until March.

Tomult, at £450, is a multitasking program which allows tasks to be written and tested individually before bringing them together within a common framework. Once in this framework, Tomult operates in real-time to reassess changing priorities from moment to moment.

So far Tomult has been used to control laboratory experiments, but ICI expects applications to extend to industrial control and into the household/hobbyist market.

The two other programs have a more limited scope. RSP (the Rexagan Statistical Package) is used for processing and evaluating arrays of experimental data, while Droptest assesses impact tests on materials.

# Brush up on your painting



*Koala Painter — Audiogenic's move into peripherals*

SOFTWARE house Audiogenic has moved into the peripherals market with the launch of a graphics tablet for the 64.

Called Koala Painter, the tablet allows users to produce full colour drawings and illustrations directly on screen.

The £89.95 package consists of the graphics tablet plus separate stylus, disk-based software and an instruction manual.

The software gives you a three-section menu — commands, brushes and then finally colour palette which offers a choice of 16 colours and 16 patterns.

The commands section allows you to combine freehand drawings with previously stored designs and basic shapes included in the menu (lines, boxes, rays, etc).

And brushes gives you a chance to vary the style of the illustration by increasing or decreasing line widths.

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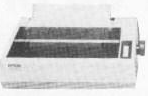

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# Sounding off on the right notes

THE NEWS is good for music-loving 64 users.

Software house Quicksilva is releasing a music program, Ultisynth 64, at about £15.00, while a keyboard has arrived from a new company called Silynn.

The Microsound 64, a full size, four octave keyboard, plugs into the 64's cartridge port.

Disk software converts keys depressed on Microsound into musical notes played through the TV loudspeaker. These notes can be stored in your 64 or saved to tape or disk for recalling.

Microsound 64 also features two slider controls which operate a simple music synthesiser. And Silynn is devloping more software enabling the £125 keyboard to produce more complex musical effects.

Microsound 64 is available from Autographics, 3A Reading Rd, Henley-on-Thames.

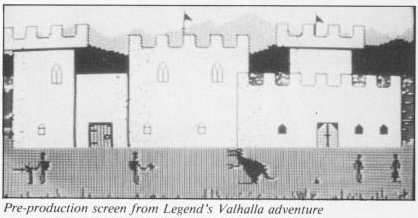
# Spectrum hits set for the 64

TWO OF last year's most popular games for the Sinclair Spectrum, Valhalla and Manic Miner, will soon be available for the CBM 64.

Valhalla, the adventure from Legend Software which introduced the Movisoft graphic animation process, will appear in February.

Legend's managing director John Peel commented: "The Commodore 64 version of the game will be similar to the Spectrum one, but obviously the graphics will be better. For one thing, the characters will be more than one colour, and we should also be able to do more with the backgrounds."

Like the Spectrum version, Valhalla for the 64 will cost around £15, and the new release is expected to confirm its position as one of the most popular adventure games around.



*Pre-production screen from Legend's Valhalla adventure*

Manic Miner, the much-imitated arcade-style game, should be in selected dealers at the same time. Software Projects' CBM 64 program is an almost exact copy of the original Bugbyte version for the Spectrum, regarded as one of the best 48K Spectrum games released last year. In Manic Miner the hero, Miner Willy, collects prizes while avoiding attacks from surreal opponents. Each of the 20 screens has been recreated for the CBM 64 version.

Programmer Chris Lancaster said that the success of the game was such that it wasn't thought necessary to radically redesign it for the 64; but there would be some changes in the sound effects.

Overall he claimed the game would be well worth its estimated £7.95 price, and should be as addictive on the 64 as it has proved to be on the Spectrum.

# Rounding up the arcade games

CHRISTMAS is traditionally the time software houses make sure they have new arcade games on the market — and last year was no exception.

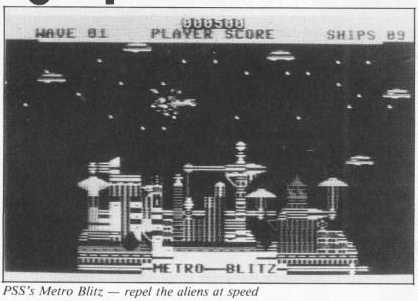
Heading the pack of new releases were titles from Audiogenic, Artic, Atarisoft and Coventry-based PSS.

Audiogenic launched its series of dual cassettes, with one side containing a Vic 20 program and the other a 64 version. First up were Cataclysm at £5.95 and the re-released Bozo, at £7.95.

In Cataclysm you command the laser outpost defending the lunar city of Erriam from the saucers of the Jovian empire. Failure to destroy the saucers results in Cataclysm.

Bozo puts you in the role of a workman climbing ladders to collect boxes from different levels of the screen. The boxes are guarded by monsters which, Audiogenic warns, "do not just wander about the screen but actually try to trap you on a particular level".

For the 8K expanded Vic




*PSS's Metro Blitz — repel the aliens at speed*

Audiogenic also launched Shifty which it promises "makes Pac-man look like the teddy-bear's picnic". The price of escaping the ghosts is £5.95.

Three new cartridges (Serpentine, Seafox and Choplifter) and one disk (David's Midnight Magic) are aimed at 64 users. Each costs £29.95.

In Serpentine the snakes threaten your serpents while eggs and frogs also make guest appearances.

As commander of the Seafox submarine you have to destroy a convoy of ships. Choplifter follows the military theme, but on land not at sea, as you pilot your helicopter to rescue beseiged soliders.

David's Midnight Magic, however, presents the more sedate pleasure of playing pinball.

It's back to a world of more violent action at PSS. Its launches included Metro Blitz (repelling the aliens), Moby Dick (blowing up submarines), Neoclyps (saving the colonial planet) and Cosmic Split (defeating the insects).

The games, from North America, run on the 64 and cost £7.95 each.

Vic users had Artic's Tank Battle to tackle. The game runs on all memory sizes of Vic and costs £5.95.

For users after more arcade flavour Atarisoft converted some of the Atari classics to cartridges for both the Vic and the 64.

Dig Dug and Donkey Kong come in at the top of the range at £29.99 each. Pacman, Centipede and Defender cost £24.99, while Robotron and Stargate are the cheapest at £19.99.

This may seem expensive, but Atari argues that its games are "second-to-none, therefore the price is not too high in terms of the quality which you get."

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# Magic moments from Commodore

COMMODORE'S attack on the software market continues this year, with Magic Voice, Magic Desk and Basketball — the follow-up to Soccer — leading the charge.

Magic Voice, a speech synthesis unit at about £50, will be available early this year. It has a vocabulary of about 200 words which are entered by the command SAY "x".

Letters and numbers are also included, along with some suffixes for adding to words.

A number of talking games and educational aids are also on their way to run with Magic Voice — the arcade games Wizard of Wor and Gorf; a series of talking books for infant school children; and nine pre-school packages covering reading, arithmetic and thinking.

All except the talking books can be used without Magic Voice.

Vic users in search of education can turn to the series of six Pixie Pack programs.

The Magic Desk cartridge, now expected early this year, can also be used with Magic Voice. This is a small business package using pictures to represent an office and its functions.

The first UK release, Magic Desk II, offers typing, calculating and filing facilities.

Also on its way for 64 users is Basketball — a follow-up to the acclaimed Soccer. This is expected to be available late spring.

# Adventures away

*Richard Shepherd's adventure challenges*

COMMODORE users in search of adventure are having their prayers answered by four companies — in addition to Commodore itself.

Bug-Byte has released Twin Kingdom Valley for the 64. Combining text and graphics, the program is in the Hobbit mould with 175 screens.

Atari specialist English Software has gone underwater for Neptune's Daughters — a multiple screen adventure for the 64 at £9.95.

Two other 64 titles come from Richard Shepherd Software, at £6.50 each.

Ship of the Line takes you back to the 17th century and puts you in command of a Royal Navy warship cruising the Mediterranean.

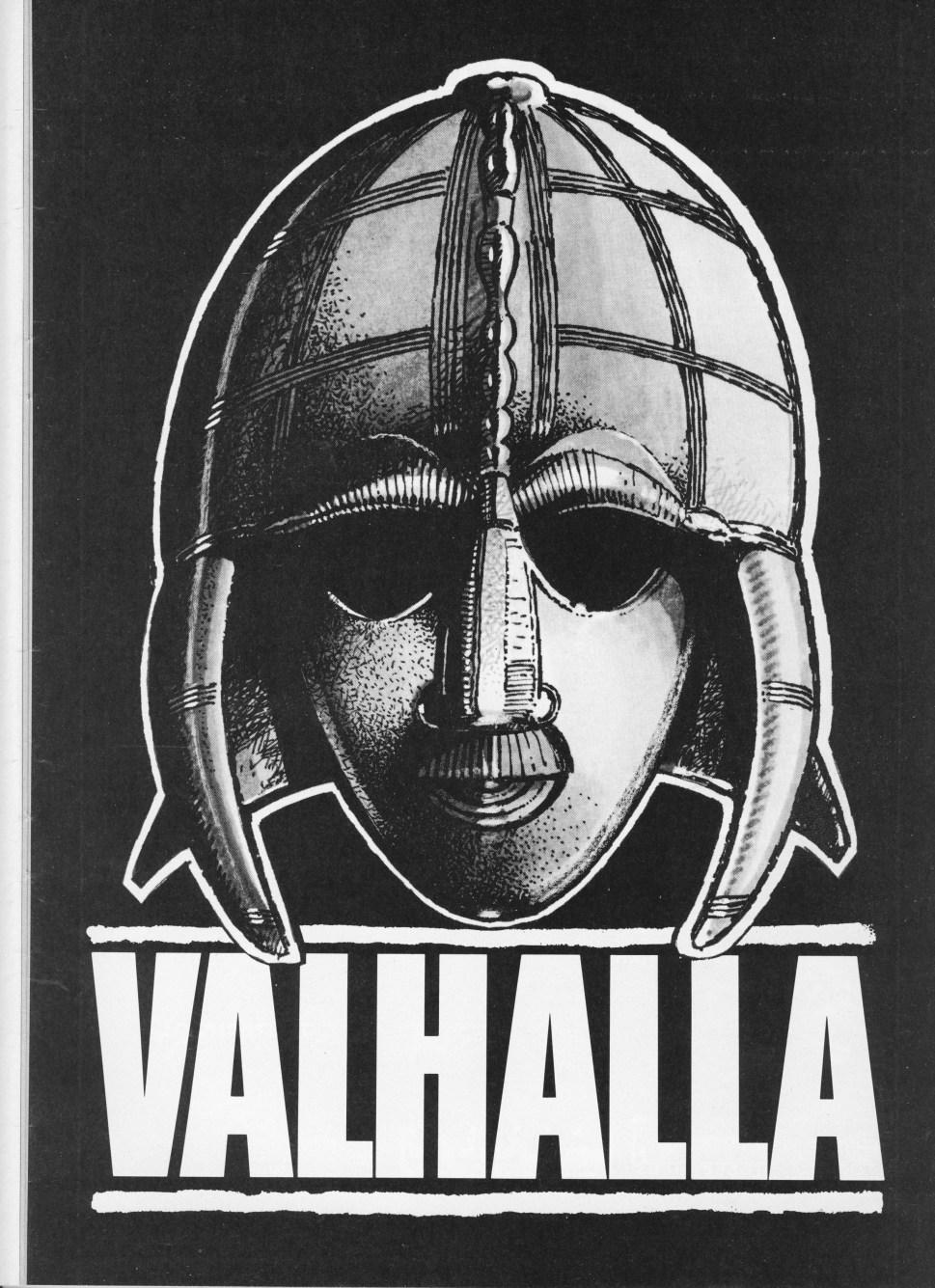
Everest Ascent brings you back up to date and sometimes down with a bump. As you plot your way up the mountain you have to avoid avalanches, crevasses, thin ice and abominable snowmen.

The fourth company is PSS whose Krystals of Zong, at £7.95, provides 64 users with arcade thrills as well.

Commodore itself has not forgotten Vic users. It plans to release a wide range of adventures, as we revealed in our previous issue.

These plans include more Scott Adams titles on the Vic and 64, along with other celebrated American games for the 64. Chief among these are Suspended, Deadline and the Zork trilogy — all from Infocom.

**If you think you've something newsworthy, call 01-437 4343 and let us know**


VALHALLA

# TERMINAL SOFTWARE

## commodore 64 games cassettes

**SUPER SKRAMBLE!**
Personal Computer News (15-21 Sept '83) gave SUPER SKRAMBLE! an overall rating of NINETEEN OUT OF TWENTY and described it as: "Well implemented with beautifully smooth scrolling and very nice graphics."

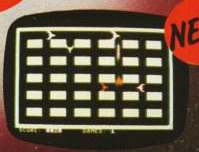
**SUPER GRIDDER**
". . . a compelling piece of frivolity that could give hours of fun." was the verdict of Personal Computer News (22-28 Sept '83).

**SUPER SKRAMBLE!**
"An excellent game" said Computer & Video Games magazine (Sept '83).

**SUPER DOGFIGHT**
The first 64 games cassette to have SIMULTANEOUS TWO-PLAYER ACTION – realistic sound effects too.

**STELLAR DODGER**
A game of skill and anticipation in which you must dodge your way through asteroids to complete your mission.

NEW



NEW

**HUNTER**
A fast action game in which your pursuers gain in speed and intelligence as you master each successive screen.

## VIC-20 games cassettes

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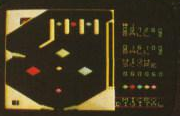

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# Mishits and bull's eyes in the battle for games users

***Pete Gerrard** looks at the games available — and picks out some winners*

LAST MONTH we looked long and hard at a selection of games software prouuced by Commodore for their own Vic 20 and CBM 64 machines, and found it to be a very mixed bag indeed. Now we're going to finish off the Commodore games, then go on to review the opening shots in the software battle from other well-known companies including Virgin and Quicksilva.

Money Wars is an enterprising game hiding behind an uninspiring title, this one, like so many others, has its origins in the early days of the Commodore Pet in a game with the obscure name of Ikebukuro.

More recently it has appeared for the Spectrum under the guise of Headbanger's Heaven, and now this Vic version follows the same old rules.

You are in control of a little man who runs along the bottom of the screen, hidden behind three invaders-type defences. On the right of the screen is a bag of money, and it's your job to steer the man and get the money back to the left-hand edge of the screen. At this point you go back for some more, and all the action gets just a little bit faster and a little bit more furious.

To make life more difficult for you, the heavens have opened up, and from the top of the screen comes a perpetual shower of little arrows. Makes a change from cats and dogs I suppose.

These arrows, should they land on you, signify instant death, so for the greater part of the game you're trying to dodge in and out from behind barriers whilst hiding from arrows. In your defence, you can make your man run very quickly, and you can also give him a shield to shelter under, but both of these use up valuable bonus units so should be used discreetly.

This cartridge game requires you to use the keyboard, which is good enough for the limited controls you have to play with. You are helped by two small blobs which float about at the top of the screen soaking up the arrows, but after about the third money bag life is getting very frantic.

Those arrows that are not absorbed and that don't hit the ground or you, crash into one of your three barriers and take a chunk out of it, and it isn't too long before your barriers begin to look very ragged indeed.

This game is curiously addictive, and manages to work new life into an old theme by adding one or two nice little extras. Well worth a look.

### Cornish?

Emmet Wars. What, you may wonder, is an emmet? According to one source, emmet is a Cornish word used to describe holiday-makers, so this game about destroying emmets ought to go down well in the west country.

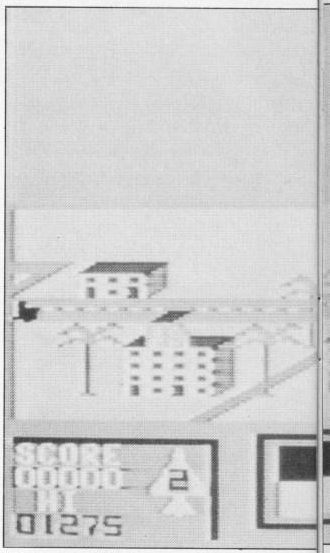
Whatever they are, they appear in a game that is uncannily like Tank Attack, and some superb machine code programming gives you an extremely responsive scrolling screen as you scan the horizons for the next wave of attackers.

These attackers frequently hide behind jumbles of rocks, and leap out at the last minute. But they appear to be fairly peaceful, since they don't fire at you, they just keep advancing down the screen. When one of them reaches the bottom of the screen, the game is lost.

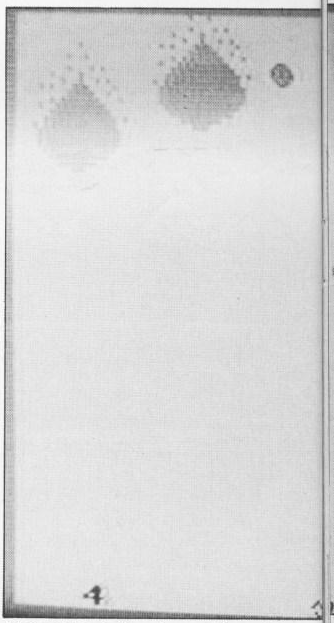
Recommended for players with nimble fingers, this cassette game is an easy one to get to grips with, but shouldn't hold the attention of the devoted arcade maniac.

The reason for this is that the action lets the scrolling screen graphics down badly. The emmets, like Cornish holiday-makers, move slowly about, and never seem to get very near to the bottom of the screen. This makes the shooting of them very easy. Just manoeuvre your sights into position and bang! Another one disappears.

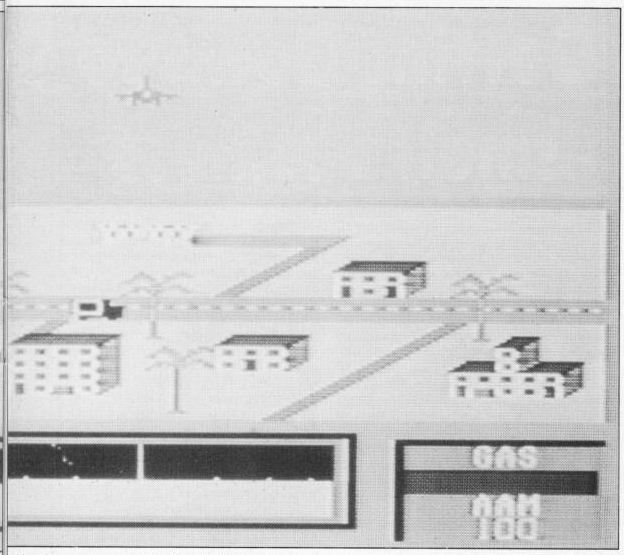
Getting rid of one wave of emmets just brings on another lot, and so the game goes on. The emmets don't appear to change their habits between levels, and they never get too close to the bottom of the screen. After 15 minutes of playing and winning,



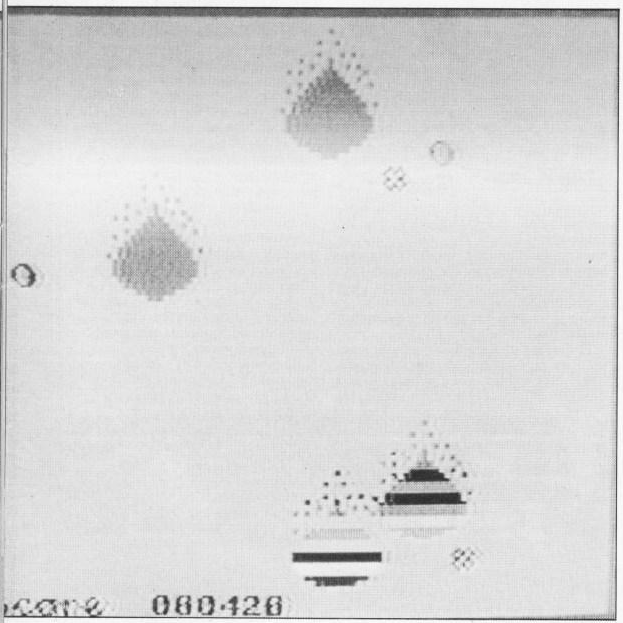

*Virgin Software's Falcon Patrol — fuel disappears at a*




*Also from Virgin is Bitmania — reminiscent of the great*




*alarming rate as you whizz through the heavens*




*Gridrunner but without the grid*

boredom set in and the machine was switched off.

Of course, Commodore aren't the only company producing software for the Commodore 64. Three others have recently bought out new products, and the prize for the most gawkish publicity must go to Virgin Software, for Falcon Patrol.

Falcon Patrol. I don't care whether the author of a program likes tinkering with Ford Escorts and drinking real ale in country pubs, but Virgin insists that you know all these things, and so while waiting for the tape to load you can read all about Steve Lee and his interests and hobbies. But what is he like as a programmer?

Reasonably good, as the opening screen shows us. A nice musical introduction leads you into the game, which starts with you in control of a VTOL jet, sole survivor of the falcon patrol, whose job it is now to defend the city against the invading enemy rabble.

To begin the game a nice graphical display shows the city in the bottom half of the screen, and a clear blue sky above. Your plane is just refuelling and topping up with missiles, you take off, and scan the radar for the signs of enemy planes.

Fuel disappears at an alarming rate as you whizz through the heavens over an impressive scrolling landscape. You can refuel at any of your many bases, but this is a hazardous task as the enemy makes no bones about destroying you while you sit there, like a lemon, frantically filling up with petrol.

In combat the movement of the planes is handled well, and the overall impression is that young Steve is a good programmer. The graphics and sound are handled nicely, and although you can only use a joystick to play the game, attemping to play it by using the keyboard would probably have been impossible.

In the first batch of software released by Virgin they were heavily criticised for the inanity of many of the games, and the fact that few of them would have been released by any other software company.

They appear to be taking steps to correct this with Falcon Patrol, and if other games live up to the same standards, they could yet become a leading company.

**Smashed**

But optimism smashed as Virgin's other game for the Commodore 64, Bitmania, appeared on the screen. Oh well, back to the ridiculous.

This game was written by a 16 year old called Kieron Brennan, so the Virgin fact sheet informs us, and young Kieron has obviously figured out how to generate your own characters on the Commodore 64, as most of the moving graphics feature home-generated characters.

The idea of the game is much more complicated than the game itself. You are inside a data bus (that's what it says) battling against the neuron flow. You have to reach the central core by destroying all the bits that the CPU sends out at you. These vary from level to level, but all have to be hit twice before they'll die.

One nice feature is a panic button which sends you onto the next level mid-game. ▶

# Getting down to small business

***Mike Grace** takes a look at the business market and finds Dialog well established*

ONE OF THE fascinating aspects of people who buy microcomputers is their desire to justify the expense, by claiming that they are buying more than just a machine to play games with or to learn computing on. This is quite illogical when you think of how much we spend on hifi, videos, alcohol, dinners out, etc, but if you do want to justify your purchase (even if only to your inner self), what is available in the software line to salve your conscience?

Of course, the immediate reaction is the database/word-processing/accounting package that flourishes under a variety of names and forms, and I must confess that to me this software has a certain appeal. But is it really of any value to the average person? And if so, which is the better package? Or, to be blunt, what do you look for and what can you buy?

In earlier times software of any value was pretty thin on the ground, and my own experiences tended to alienate me as material I paid for suffered from bugs and restrictions that made the price a bit high. More recently the competition and the technical advances have tended to mean that we, the customers, are better served and better able to obtain value for money. This brings me to a company calling itself Dialog Software which has produced a very neat collection of programs with the small-time user in mind. (My definition of small-time is not a slur against anyone's physical appearance but more an expression of possible use and consequently price expectation.)

### It takes two

Dialog is really Chris Ely and John Ayton, two entrepreneurs who decided that the Commodore 64 looked an interesting machine with potential for databases and the like and began to write software. They were able to form Dialog in January 1983. They opened a bank account after their very first sale (£18.00) and have built from there. Today they have a solid base of seven programs aimed at the first time user (which they call the first phase of their business) and are about to expand into the second phase.

The programs run on both the Vic 20 and the Commodore 64 (as well as the Spectrum and BBC machines) and cassette and disk-based. They all reside in memory at the moment (as the programs are for cassette) which does limit the amount of memory available. The second phase will be aimed at the more advanced user where disk drives will enable direct access to the disk, thus increasing the scope of information available and the potential for greater storage. What this means in real life is that if you were using the database for names and addresses then the existing phase limits you to a smallish number (between 100 and 200 perhaps on the 64) whereas this can be vastly increased once you can store the whole lot on disk and call them up as needed.

Let's have a look at the actual software. The first program available was DFM, a flexible database which has remained the mainstay of the company's range. One excellent aspect of Dialog's service is the free updates which arrive once you have purchased a program. I bought DFM back in the early part of last year for my Vic, and have received two free updates since for the 64 which are excellent improvements on the original. (NB Programs for the Vic will run on the 64.)

DFM is user-definable — which means that you can decide for yourself how many fields you want and how long they need to be. For anyone not into databases yet I will briefly explain that this means you can store exactly what you want because you can start by setting your own fields (a field is just a section on your record). Let's look at an example which is probably one of the most likely uses for DFM, an address book. If you wanted to set up fields for that you could follow the outline below:

Field 1. NAME
Field 2. ADDRESS
Field 3. TOWN
Field 4. COUNTY
Field 5. POSTCODE
Field 6. TELEPHONE

Thus this example contains six fields, but DFM has the versatility of being able to add up to nine more should you want (eg stock number for a business, interests for a hobbyist club, subscription for a society).

DFM will cater for numeric fields (as in subscriptions or stock prices) and you can perform simple calculations (addition, multiplication, etc) on them. Otherwise the fields are character only (which can be numbers of letters but you won't be carrying out calculations). The maximum field length is now 36 characters (it was previously 19) which is far more than you'd be likely to need, but this gives the system greater flexibility.

Having set up your fields you just enter the data in — in the example above you would enter the names and addresses — and then save to disk or tape. Having done that you can carry out sorts (extremely handy for names) and searches, amend the data, delete records, print out records, etc. What sets DFM apart form the other systems I've tried so far is the ease of use and the flexibility for the price (£24 at present).

In the space available I will try and describe what I have found to be the real advantages of DFM in the nine months or so I've been using it. First, it is very easy to amend data, so if you make a mistake you don't have to keep going back and redoing the whole record just because of a silly spelling mistake. (Oddly enough with some systems I've tried you cannot alter a record without rewriting the lot.)

Secondly, if you decide to change the name of your file, you can do so easily. This is also very useful as I've often spent an hour or so keying in data only to discover I've got to change the title — which means starting all over again.

Thirdly, the program is all in Basic and you can take a copy of the disk or tape in case of damage later — another plus. If your programming is up to it you can alter the Basic to suit yourself, or Dialog will alter it for you for a sum of £10-£20, bringing tailoring of software for the individual into an extremely reasonable price bracket.

Fourthly, a report writer section allows you to list out information in a format that suits you, only recording or printing the specific items you have decided to print. I found this most useful in drawing up lists of names and items that I was referring to at one time, then adjusting it to another list at a later date.

There are other examples I could quote, but space prevents me from telling more. I am impressed by the versatility and ease of use of this program. While it is limited for a businessman with 1,000 records or so, for the average micro-owner who would just like to catalogue a Christmas card list, or

```
ALBUMS  [ 3 ]
================================================================================
INDEX 1     HERMINE                          INDEX 2     HERMINE DEMORIANE
INDEX 3     CRAMMED DISCS CRAM 019           INDEX 4     MUSIC ALBUMS - VOCAL IMP
================================================================================

        HAPPY HOLIDAYS      002              I WON'T MAKE IT WY   335
        THE THRILL IS GONE  125              TOO MANY MEN IMLF    558
        WAITING             220              BLUE ANGEL           600
        -                   -                -                    -
        -                   -                -                    -
        -                   -                -                    -
        -                   -                -                    -
        -                   -                -                    -
```

*Catalog — instructions for entry and moving around are included*

keep a record of his copies of *Popular Computing Weekly*, this system is ideal — well-priced and most important, easy to use.

A subsidiary program called DFM Labels will allow you to print out mail-order labels from a DFM address list (think of those Christmas cards again), works well, and costs an extra £10. Can't be bad.

Another Dialog program is Journal (£19.50) which is essentially a financial diary. On loading (and here the manual needs updating as it says you need to load "JOURNAL 32" whereas my listing of the directory revealed that the program had been saved as "JOURNAL") you are greeted with a large title and the enigmatic question "Is user ID required?" Shades of secret service and mystery — but no, it's just a way of identifying which journal you want as the software has provision for you to keep several different diaries of the same date if you wish.

The instructions are adequate, and the layout is very nice. Once you get into it, entering and deleting data is pretty easy, but to be honest I question the necessity for having a computer diary at all, as it really is easier to write it all down in a book. Having said that, if you are involved in sums of money then the addition and subtraction facilities are handy as it's all automatic (of course). After all, that's what computers do so well.

Some people do find databases difficult to work out for themselves (to be truthful one of those people used to be me) and so Dialog has made two packages similar to DFM, but with already defined fields, and a rather nice graphic screen display so that you can imagine you are using a standard form or page in a book. This is really taking user-friendliness to the extreme, and of course you lose versatility as your fields have already been defined, but for the casual collector of information (such as a catalogue of articles or a collection of records) who doesn't really understand how to use the database this idea is perfect.

### Similarity

Although the two packages are very similar, Catalog is, to my mind, the better. On LOADing you are presented with a screen format which resembles a box containing four headings and 16 sections for your appropriate records. The sample data on the disk is called "ALBUMS". It is really a catalogue of LPs with the title, artist, number and classification followed by a listing of the tracks on sides A and B. By contrast the other program, Datalog, has only eight sections but has four titles which you can name yourself. This is more restrictive for cataloguing magazine articles as you only have eight sections, but if no catalogue numbers are involved then it might be a better system for you.

The actual procedures involved in both are similar (involving less total programming of course). Both are reasonably priced (£19.50 for Datalog and £16.50 for Catalog) and are pretty versatile. In both cases instructions for entry and moving around the programs are included which should make their use fairly easy after about 10-30 minutes (depending on previous experience).

Features that particularly appealed to me were that you could abort an entry anytime (SHIFT plus RETURN), move quickly past various sections (just keep pressing RETURN), alter data and headings at any time, and press * at any time to avoid repeatedly pressing RETURN. These are all features of software that has been field-tested so that little snags have been corrected.

Of course, you can enter and delete data, amend it easily, sort and search, and all the usual things. One nice touch is that whenever you make a move that might wipe your data you are reminded that you can SAVE to tape or disk — helpful for people like me who tend to have their minds on higher things at times and inadvertently press the wrong button again. PRINTing is also fairly versatile, allowing you to print out the whole file, or just selected records in any order you like. Also both have the facility to check and see how many bytes of memory are left once you get near to 'filling' your record up, although there is a bit of a time delay on this with no reassuring message to keep you happy that the program hasn't crashed.

### Ambition

The blurb with the disk (rather ambitiously I feel) claims that there are a whole host of possible applications such as listing accommodation, a creative notebook, hotel guide and timetables. Whilst it is true these are possible applications, I still think a good notebook may be quicker and easier for most of us. But (and it's quite a big but) where this software is handy is in the ability to search and sort. For me this is the real advantage of any computer. Take storing articles from a journal. You must all know the frustration of searching through a pile of back issues looking for one particular article. Well, had you entered all those articles into something like Datalog then it would be a simple matter to call up the file and search for a keyword (such as 1541) — and there it would be on the screen.

However the problem is that it takes quite a lot of self-discipline to keep entering all those articles week after week (or even more to sit down after six months and enter the lot). And that, really, is the snag with this software — to make it work you do have to keep hitting the keys. But if you can do that then these two packages are both good value.

As I mentioned earlier Dialog is planning a phase 2, which may well be available by the time you read this. For my money this is where the really exciting stuff comes in for disk drive owners — so keep watching the adverts or contact them direct (19 Shorts Gardens, London WC2H 9AT). But if you are still a tape-only owner and thinking of expanding your computer a little then the existing programs are an excellent introduction into the world of databases. But, as with all software — the best advice is for you to see it and decide for yourself whether you could use it.■

◀ But as the next level isn't too far removed from the previous one, you might as well stay where you are.

This is reminiscent of the great Gridrunner, only without the grid. Your little ship can move up the screen a little way, and has total mobility in left and right directions, but is a bit slow when it comes to sending out the death-destroying bullets.

The explosions when you die are satisfying, and the graphical display is a good. Plenty of whizz-bang colours, silly noises everywhere, and worth losing a few lives for.

But, and it's a big but, the game is very tedious in action. Joystick only, the unrelieved display of defined graphics has been handled better by other games, and one little alien moving about the screen looks lost against the background of everything else. One could almost be forgiven for feeling sorry for the mite, and letting him past.

### Visions

Colliding with an alien reveals that they aren't all sweetness and light, as another life vanishes in the aforementioned graphical pyrotechnics.

I had visions of Purple Turtles being the result of some drug-induced games-writing session, but in reality it is a very good cassette game for kids, and anyone who (as the instructions from Quicksilva tell us) is young at heart.

To the tune of Messing About on the River, the instructions are displayed on the screen before the action commences. You are told that you're going to indulge in the sport of turtle bobbing, as practised by the extremely rare purple turtles.

These turtles float happily about in the river, and it is your job to control a little man, make him jump from turtle back to turtle back, and get over the other side of the river where some enticing fruit awaits you as a reward. You then have to get back again with the fruit, and when you do, drop it at the foot of a little tree on the river bank.

An owl in the tree jumps up and down with delight, and you have to go back and get some more. Up above, the blue sky has a cheerful sun beaming down on you, fluffy white and black clouds drift by, and from time to time a balloon sails across the sky.

Purple Turtles is a a good clean game, and makes such a change from destroying aliens and saving the universe. There are nine levels of play. The difficulty comes from judging when the turtles are going to stay at the top of the river, in which case you can hop across them, and when they're going to float down to the bottom, in which case you'll jump into the river and die.

The only dissapointment about this game was the graphical display of your man, as the rest of it is, well, the only words have got to be — so cute.

A cheerfully optimistic game, and anyone with kids ought to have a copy. Even if you haven't, the change from zapping aliens to going turtle bobbing is a nice one to make. The sort of game that makes the sun shine on rainy days.

Quicksilva's move back into more ▶

◀ familiar territory with Quintic Warrior, a destroy everything game including the traditional barbaric space cover depicting someone's idea of what Quintic Warrior ought to look like.

This joystick-only game got off to a bad start when the screen initially displayed five pages of instructions. Five pages! One would have done, and the first disappeared from view too fast to be read anyway.

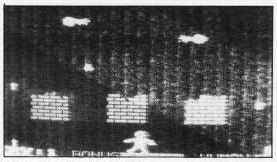
All they tell you is as part man, part superman, you are the quintic warrior who stands alone against the sinister crabmen and mangled mutants in a dome city of a future gone mad. The usual run-of-the-mill outing that any games player will be familiar with.

Using your quintic sense, to say nothing of the blaster gun, you have to shoot at everything in yet another attempt to save some fabled city from doom and destruction.

There is something vaguely reminiscent about this game, as you stand alone at the top of the screen, firing at the ravaged hordes of aliens coming up at you from below.

Where those X-Y zappers I could see moving up the sides of the screen refugees from another game? Was the one on the bottom of the screen on the run from Jeff Minter? Why can't anyone have original ideas anymore?

Yes, it's all too familiar again. The action is suitably fast and furious, and clearing one horde of aliens merely brings on another lot, until the inevitable happens and you die a gory death at the hands of the



*Commodore's Money Wars — enterprising*

mangled mutants. Or was it a crabman? Hard to tell really.

But disaster at the end of the game. Having been annihilated as usual, the screen froze and the words game over flashed on and off a few times. This is rubbing it in, but the words kept on flashing. Pressing every key resulted in nothing happening, until I reached the run/stop key, at which point pressing run/stop and restore got us out of the program and left a machine that would not respond to anything. Tut tut, Quicksilva. Stick to turtle bobbing!

Hungry Horace: Is there anyone in the computer world who hasn't heard of Horace? Horace is a loveable little rogue who first appeared in a park on the Spectrum, picking the flowers and being chased by the park guards, while eating their lunches when they dropped some food attempting to chase Horace out of the park.

Horace has had a number of adventures on the Spectrum, and now the little chap has switched over to the Commodore 64, in a cassette game from Melbourne House.

Horace is a little sprite, with eyes and legs and a bulbous body, who roams about the maze, that is the park, picking up all the flowers (usual sort of Pacman stuff), avoiding the guards and eating any bonus food that should appear. The maze has one entrance and one exit, and happily you don't have to pick every flower before going onto the next of four different levels.

Obviously, the further you progress the harder it gets, and at one point Horace was being chased by four different guards. He meekly surrendered and started again.

As well as the flowers, guards and food, there is a little bell hidden somewhere in the maze. Ringing the bell (or eating it, which is what he appears to do) sends the guards into a panic, and makes life easier for a little while.

And so the game goes on. Get through the fourth level and it's back to the beginning again, with everything happening just a little bit faster. But this is not the end of it. One superb feature of the game is the ability to design and save onto tape for later use your own mazes.

This is done very easily in what is termed edit mode from the original screen menu before the game commences, and you can draw mazes, put flowers down, bells, entrance and exit, and chuck in a tunnel or two for good measure.

The game can be played in a virtual limitless number of different mazes, which will prolong it's lifetime indefinitely.

It is a great little game, and Horace shows himself to be just as much at home on the Commodore 64 as he was on the Spectrum. When's the next one coming out? ■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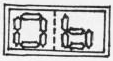

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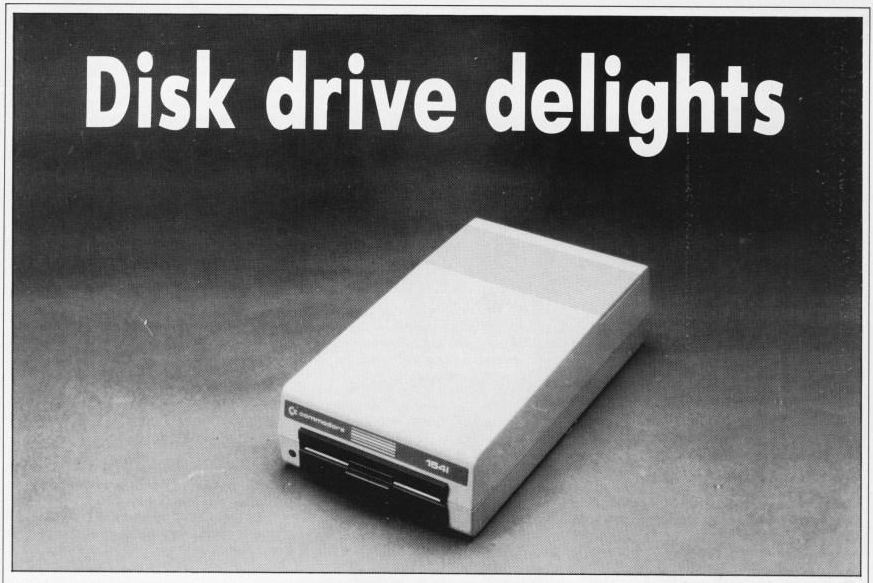
# Disk drive delights



**HARDWARE REVIEW**

***Pete Gerrard** look at life in the fast lane*

NEW VIC 20 owners have to, although older ones were given the choice. Commodore 64 owners can do what they feel like, as long as they don't mind parting with an unreasonable amount of money.

Whether you choose for yourself, or have the choice forced upon you, anyone who is using a home computer, for whatever application, will sooner or later have to have some means of storing information.

With the popular Vic 20 Starter Pack it is assumed that you're going to be using a cassette deck, since this particular item is included in the package. For a Vic 20 this is a fairly safe assumption to make: not even Commodore would pretend that this computer is a contender in the "business machine of the year" stakes. A 22 column screen and a paltry 3.5K of useable RAM combine to put this machine in the purely beginner/hobbyist ranks.

However, if you decide that you would like to use a disk drive, there are a number of options open to you, and later on we'll take a look at some of the more popular drives currently available.

For Commodore 64 owners the choice is theirs: you can buy a cassette deck at the fairly high price of £45.00, although these are currently difficult to come by, presumably because all of Commodore's stock is being used up in Vic 20 Starter Packs! On the other hand you can throw caution and the bank balance to the winds and go out and purchase a disk drive.

But first of all, why buy a disk drive anyway? That is indeed the question, since disk drives are certainly not cheap. At present, Commodore's recommended drive for both the Vic 20 and Commodore 64, the 1541, costs around £229.00. There used to be two different drives, one per machine, and the original Vic drive was intended to work with both machines.

The 1540, as we all now know, wouldn't work with the 64 when it first appeared, and a new unit was rushed into being. In the meantime a few unscrupulous dealers managed to make a fast buck by charging unwary users a large amount of money for installing a small amount of ROM chip in the original 1540 drive.

There are other drives available, including the entire Commodore range of drives for the Pet series of computers: 7.5 megabytes can be yours for a cost of just £2,495, although it is debatable whether anyone would spend 12 times the cost of the computer on a disk drive.

The advantage of disk drives should be obvious to anyone with the slightest interest in computing, and having spent a couple of hundred quid on buying a computer it must be assumed that you know at least a little bit about the business.

Cassettes are slow, and can store only a limited amount of information. For anyone performing any sort of file handling, cassettes are a virtual no-no: random access is impossible, and only sequential access can be used. This is the difference between records and tapes: a record can play any track you want to simply by moving the stylus to the track in question, whereas a tape has to wind through the rest of the songs before reaching the required one.

There are disadvantages to disks. Tapes are easy to copy, as anyone with a twin-deck stereo system will testify. Even those little manufacturers' tricks of detecting whether the play button is still depressed on the cassette deck after the program has finished loading can be circumvented by quick reactions and a pair of scissors.

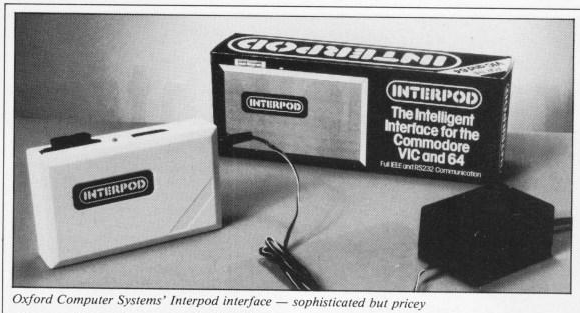
Disks are much harder to copy, they also (individually) cost a lot more, but if you ar intending to use your system for any kind of serious use, disks it has to be. So, what are the kinds of drive currently available?

The aforementioned 1541 is a 170K single drive unit. You can use both sides of a disk if you are brave enough (I've been doing this with Twinlock 1241-00 disks for some time now, without any problems . . . yet!), but most people recommend that you stick to using just one side of the disk. This drive has the advantage of connecting directly to the RS-232 serial port at the back of the 64 or Vic, and having two such ports on its own back. One connects up to the computer, and one is for further daisy-chaining of disk drives or printers.

A word of warning though. Commodore states that you can happily daisy-chain disk drives to your heart's content, and transfer programs quite easily from one drive to another, provided that you change the device number of each drive beforehand. You can change the device number by issuing the following series of commands:

```
OPEN 15,8,15
PRINT#15,"M-W"CHR$(19)CHR$(0)
CHR$(2)CHR$(32+ND)CHR$(64+ND)
CLOSE15
```

where ND is the new device number ▶




*Oxford Computer Systems' Interpod interface — sophisticated but pricey*

◀ you wish to give to a particular drive. Letting ND equal 8 gets you back to device number 8 again.

This is all very well, but it doesn't always work. Two people that I know can now testify to having blown one of the 6526 chips in the 64 by attempting to link up two different 1541s, following the recommended procedures.

If you don't happen to know a friendly dealer who'll take 5 pints of Guinness off you in exchange for a new chip, replacing this will cost you a fair amount of money. This includes not only the £13.50 (or £25.00, or whatever price your dealer cares to quote) cost of the chip, but also the fixed service charge that is included for doing even the slightest amount of work, regardless of whether the job takes nine minutes or 59.

Apart from this odd habit of misbehaving every now and again, at least the disk drives work. They are slow, but they do the job that they were designed to do. That is, provide a reasonable storage facility for an acceptable price.

But what if you want to store more than 170K? To do this will not only require buying a more expensive disk drive, but it will also require buying an interface into the bargain.

## Communicating

To start with interfaces first of all, there are a number of units currently available that allow your Vic or 64 to communicate with IEEE (the standard on all Commodore's other drives) devices, Centronics, and others.

For those of you with a desire to connect up to IEEE drives, the most expensive interface currently on the market is probably that available from Oxford Computer Systems (which lives at Hensington Road, Woodstock, Oxford; telephone (0993) 812700) at a price of £99.00. This has been recently reduced from £125.00, but even so it is still bordering on the pricy side. it allows a Vic or a 64 to connect up to either IEEE or RS-232 devices.

Now you may be wondering why anyone should produce a unit that gives you an RS232 signal, when the two computers already have one on board. Well, in this area, as in many others, Commodore enters a world of its own when it comes to copying "standard" products. In fact Commodore's RS-232 shows about as much resemblance to the real thing as Duran Duran does to Beethoven.

The Oxford device is known as Interpod, and plugs into the back of the computer, leaving a number of sockets free on Interpod itself. There are the aforementioned IEEE and RS-232 ports, as well as a Commodore RS-232 port to allow you to continue to daisy-chain other Commodore peripherals.

No doubt about it, Interpod is a sophisticated device, and in use is totally transparent to the user. It doesn't take any memory from the computer, it allows you to talk to all these strange devices, and has a number of built-in commands all of its own. However, it's temperment is akin to that of a British Rail train, since if anything can go wrong with it, it will. More often than not a simple LOAD ERROR from disk will cause the entire system to go to sleep on you, and it will require a reset of at least Interpod (and in a bad case the complete computer setup) before the computer will talk to anything again.

If sophistication is what you're after, then buy Interpod. But there are less expensivee options. For example, Dams (at Gores Road, Kirkby Industrial Estate, Kirkby, Liverpool, on (051) 548 7111) produces a cheaper number for both Vics and 64s, at £59.95. This is purely an IEEE interface, and as it plugs into the cartridge slot of the Vic or 64 it does tend to get in the way of some commercial software, so demand to see a running version of the setup you're after before parting with any money.

Others are available — for example from Impex (Metro House, Second Way, Wembly, Middlesex, on 01-900 0999), Microware (1342B Route 23, Butler, New Jersey 07405, U.S.A., on (0101) 210 838 9027) and Audiogenic (34 Crown Street, Reading, Berkshire, or call (0734) 586334). Between them you'll be able to get an interface for anything from a disk drive to a pop-up toaster.

But back to disk drives. There are a wide range available from Commodore itself, and an extremely small range available from everyone else. So small in fact that hardly anyone in this country is supplying anything other than Commodore's own disk drives.

The Commodore 4040 is a double drive unit, with each drive giving you a capacity of 170K, single sided. The sort of price you can expect to pay for this unit varies enormously, but you won't get much change out of about £300 unless you're buying secondhand. I've seen one person offering a 4040 for £250.00, so it is worth looking around.

But (there's always a but) this drive does not have the latest version of Commodore's Disk Operating System (known as DOS, since that's what the drives tend to do when searching for a file). And writing, say, a relative record program with the 4040 is difficult, to say the least.

The dreadful 2031 should be ignored. This is a 4040 that has been chopped in half, but unfortunately the price didn't suffer the same fate and it remains an expensive single disk drive. By the time you've bought the relevant interface (Dams, or Oxford Computer Systems), you'll have paid out about twice the cost of your computer, so you might as well have bought the 4040 in the first place.

## Big brother

Big brother to the 4040 is Commodore's 8050, another double drive system, but this time giving you around half a megabyte per disk. This has DOS version 2.5 installed in it, and with it a whole range of special disk commands to allow the user to easily create a random access system.

It will cost you a lot more money of course, around £800.00, but for a megabyte of memory, and random access, anyone considering using a Vic or 64 in business would do well to scan the secondhand columns for a knock-down 8050.

There are bigger drives, notably the 8250, a double sided version of the above, but the prices begin to rise beyond the level that even the most ardent computer enthusiast would consider, so you'd be well advised to stay clear of them.

Well, as we've already seen there aren't too many "independent" drive's about, although a number of companies are now begining to exploit the technology behind the three inch disk. All the ones that I've already mentioned use the standard five and a quarter inch disks, but newer companies, like ITL Kathmill (on (0634) 815464) are beginning to use the smaller three inch disks. No one has yet produced one for a Commodore machine, but it can only be a question of time.

Stringy floppies, a cross between a disk and a tape, are also slowly coming onto the market (*á la* the infamous Sinclair microdrive), but their reliability is as yet unproven, and their availability is very restricted.

So if you're going to add a drive to your system, you might as well make it a Commodore one. They're not the fastest in the world, but they do work with Commodore's computers, and their prices are lower than other manufacturers' machines specific drives.

When microdrives and stringy floppies become available *an masse,* we'll let you know, but until they do, better the devil you know . . . ! ■

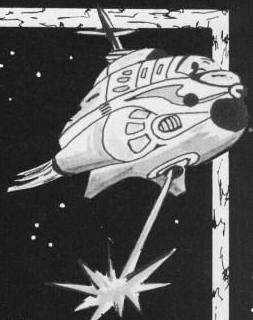
## METAGALACTIC LLAMAS BATTLE AT THE EDGE OF TIME

A fast and original game for the unexpanded VIC. Challenging and colourful, with good sonics and a unique game action and design, this promises to be the most exciting new 3.5K VIC game since the introduction of GRIDRUNNER nearly a year ago. **£5.50**

## LASER ZONE

Experience Laser Zone – an utterly NEW totally ORIGINAL masterpiece of Video games design. Learn to control two spaceships at once. Feel the EXHILARATION as, after long hours of practice, you control the two ships so that they function as a smooth, co-operative team! Feel the raw POWER as you lunge for the electro button and BLAST your enemies into expanding clouds of SPACE JUNK!! Feel the humiliation as a carelessly aimed BLAST slams into the side of your last remaining ship!! 8K expansion required.

Available for Commodore 64 **£7.50** and VIC-20 **£6.**



## MATRIX

Jeff Minter has taken Gridrunner – the game that topped bestseller charts in USA and UK – and created an awesome sequel.

Graphically superb, it features multiple screens, new aliens and attack waves, mystery bonuses, renegade humanoids, deflexor fields, diagonal tracking, countdown/panic phase and much, much more...

Packed into 20 mind-zapping zones and accompanied by incredible sonics.

8K expansion required.

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## ATTACK of the MUTANT CAMELS

Planet earth needs you! Hostile aliens have used genetic engineering to mutate camels from normally harmless beasts into 90 foot high, neutronium shielded, laser-spitting death camels!! Can you fly your tiny, manoeuvrable fighter over the mountainous landscape to weaken and destroy the camels before they invade the humans stronghold! You must withstand withering laser fire and alien UFOs. Game action stretches over 10 screen lengths and features superb scrolling, scanner 1/2 player actions and unbelievable animation! Play this game and you'll never be able to visit a zoo again without getting an itchy trigger finger! Awesome m/c action!

Available for Commodore 64 **£7.50.**

## HOVER BOVVER

A totally original arcade game for C64 featuring outstanding graphics and a sound track created by a professional Piano Wizard. Gordon Bennet has borrowed his neighbour's Air-Mo lawnmower. Mow your way through as many of the 16 lawns as you can before the pursuing neighbour retrieves his mower. Set your dog onto the neighbour to help you out of tight spots and don't annoy the gardener. Try not to plough through the neat flower beds or overheat your mower!

**£7.50**

## ABDUCTOR

A classic new space game! ZAP the swirling alien hordes before they ram you – and abduct your humanoids! Survive the assault for long enough and you'll get an extra stage on your spaceship with double firepower! Awesome unexpanded VIC Action. **£5.00**

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Finally true arcade quality on the unexpanded VIC! Shoot down the segmented DROIDS invading the grid. Beware of the pods and zappers! The awesome speed, sound, and graphics gives you the best blast available for unexpanded VIC.

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# Llamas at speed the Minter way

***Graham Cunningham** talks to Jeff Minter — the man behind Gridrunner, mutant camels and many others*

YOU'VE SEEN THE llamas and the camels — now meet the man who runs the grid, Llamasoft's Jeff Minter. The first computer he ever came across was a Commodore machine, but it was a Pet, not the Vic 20 or CBM 64 which he's since become a master of.

Jeff studied computers at sixth-form college in 1978, teaching himself Basic in four to five months. But he doesn't recall the time with much fondness. "We were taught a dead boring, dead low level schools language called Cecil," he says. "We didn't get near a keyboard, the programs all went away somewhere else and we got printouts back. And we had to do silly things like follow a convention that the figure O should be crossed rather than the number zero." But hidden away at the back of the classroom was a Pet and Jeff eventually got to grips with it, moving on from Basic to machine code.

This was the time when Space Invaders was all the rage, although Jeff had his sights on something higher. He lives in Hampshire but he comes up to London to visit the arcades where he discovered Star Fire — "the first third person space game I'd seen, where you were actually sitting in the ship". So he wrapped up his Basic version of Space Invaders and moved on to machine coding Star Fire, using borrowed books and standard monitors without assemblers. By this time too Jeff had bought his first computer, a ZX80, "after saving up for months".

## Out of step

But his programming was advancing out of step with his academic career. College may have introduced him to computers but it didn't allow him to take an A level course in the subject. As a result at university Jeff had to do mainly physics and maths "which I hated — I fouled up the maths and so I had to go". Next stop was Oxford Polytechnic "for a more computer oriented course". Jeff also made another move, "my first big upgrade", from the ZX80 to a ZX81. Now this time was divided between poly studies during the day and graphics programming for DK Tronics at night.

Then came another change of direction. Jeff caught a virus which put him out of the polytechnic but "turned out to be one of the best things that ever happened to me". So 18 months ago it was more a case of "jeopardised Jeff" than "manic Minter" — but then the Vic 20 arrived. Jeff bought one of the first ever Vics and he's still using it now. The reasons he chose the micro were the "nice keyboard, good colour and the fact that I was familiar with Commodore machines". Then he wrote the first machine code game to come out under his own label, Andes Attack from Llamasoft, with the South American mountain chain combining the Peruvian connection.

## Animals

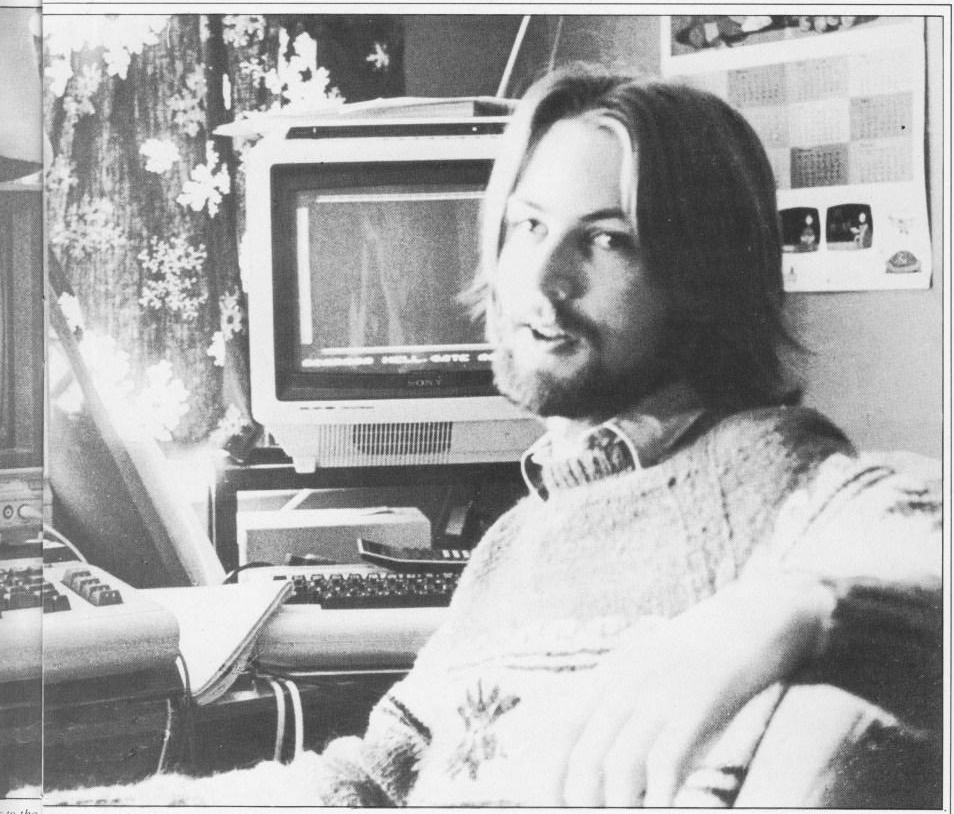
Camels had been Jeff's favourite animals at school, and he's going to Egypt this year to see them in their natural habitat. But now he prefers llamas — "they're hairier and usually more docile, although I've also got a minority interest in sheep and goats". Llamas have been used in traditional Peruvian designs for more than 1,000 years. Now they'll be appearing in a newly designed title page for all the Llamasoft games, in a mix of grey, beige and dark brown colours. As Jeff works he is surrounded by the same motif — on rugs, cushions and on his jumpers. Jeff was also delighted to read that one of the designers of the original Apple keeps a herd of llamas. Camels have not been forgotten, though — on top of Jeff's monitor perches a four-feet high model of one, "and other members of the South American camel family may appear in the future games".

Andes Attack itself is a version of Defender, revealing Jeff's love of the arcades. It was on display at the Commodore show in summer 1982, caught the eye of an American company, Human Engineered Software, and since then the llamas have never looked back. Next up was Traxx — "the first of the painting games which there's so many of now".

Jeff admits that Andes Attack and Traxx both show their arcade roots but he insists that originality is the key to writing a good game. He still visits the arcades whenever he's in London but he tries to work out what makes a game good rather than just copying it. "it's like musicians — they listen to music but don't just repeat what they've heard". And, anyway, Jeff adds: "Copying is boring, I've no interest in doing another Donkey Kong." He thinks that it's new ideas that should be encouraged — so "arcade people should nail the copiers". He's none too pleased either to see overseas copies of his games credited to other local, companies, and UK games incorporating routines he originally wrote.

After Traxx came Abductor "where you shoot the aliens as fast as you can" — followed by the program which has made Llamasoft a household name among Commodore games fans, Gridrunner. Speed was again the essence. Jeff explains that he wanted "to do something very, very fast for the unexpanded Vic". He thought

*Jeff Minter — with Revenge of the Mutant Camels to th*



*left and Hell Gate in the middle ("so fast it will make Robotron look like a walk in the woods")*

of the name first, having "loved the title of the film Blade Runner"; borrowed a little from Centipede, rebuilding it around a space theme; spent a week on the coding, "getting as much as I could into 3½K"; and then there was Gridrunner. The main masterstroke in the game he reckons is the Zapper, which he describes as "a very efficient terror weapon".

Jeff says Gridrunner "felt really nice as I was writing it". He was not the only one who liked it. The people in California called him up at 3 o'clock in the morning to pass on their congratulations. Gridrunner's success presented no worries about follow-ups. Jeff says he's "always full of ideas", and the one he chose to program next was Laser Zone.

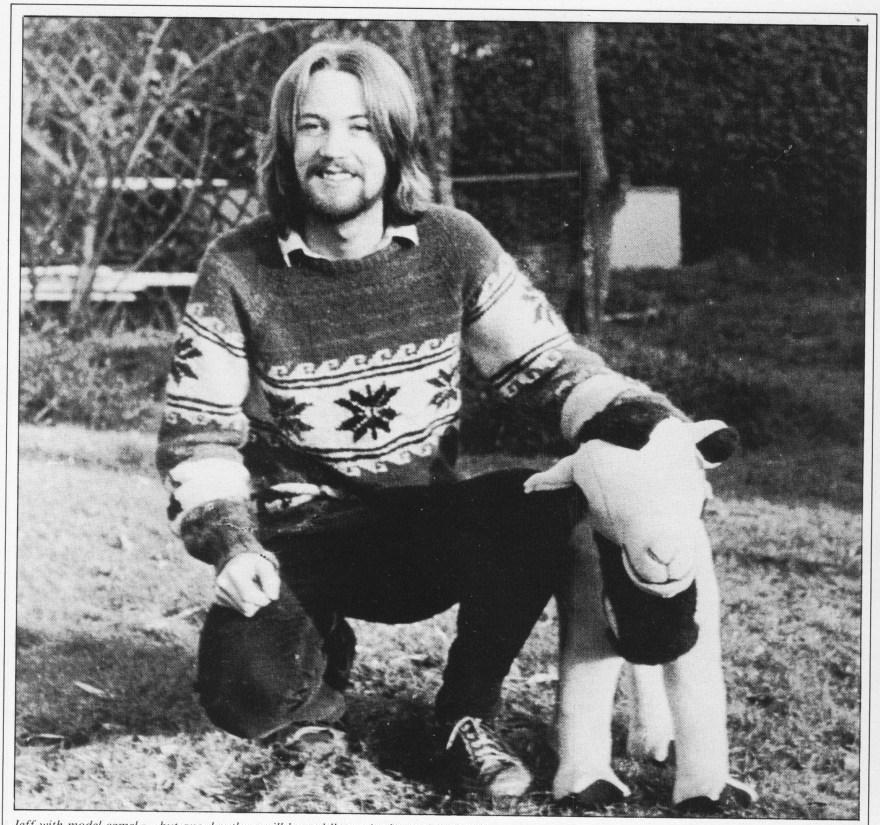
Jeff still loves this video game, and he's working on a follow-up now. Laser Zone gives you control of two space-ships which you co-ordinate to destroy all who intrude on the zone. Hell Gate, due to be released early this year on the Vic, sets you a similar task — but controlling four ships, one on each side of the frame. If you move the left-hand ship up, the one on the right goes down as well; move the top ship to the right and the one at the bottom goes left. So if you fire when any ship is in the middle, you destroy its partner. Jeff promises that Hell Gate will be "so fast it will make Robotron look like a walk in the woods".

Laser Zone was the fifth game from the Llamasoft stable, all on the Vic 20. The arrival of the 64 brought a conversion of Gridrunner, followed by Matrix ("a kind of Gridrunner Part II") for both machines, and a conversion of Laser Zone.

Even when transferring a game from the Vic to the 64, Jeff prefers to write from scratch. As he explains: "This means you can tailor the program to the particular machine's capabilities." So Laser Zone on the Vic is written in entirely single character colours "because this looks best on the Vic which has big pixels" — pixels being the dots which make up the screen. But on the 64 Laser Zone uses multi-colours "because the pixels are smaller".

In fact Jeff is "in love with the 64 — it's beautiful". The only advantage of the Vic is that "I can get more weird noises out of it than the 64". And the particular disadvantage is the Vic's small screen. Jeff agrees that the Basic on both machines is not too hot, "but the 64 is great for machine coding and the interrupts are really good". And "all the things wrong on the Spectrum are right on the 64: it's got a good keyboard, two joystick ports and excellent sound through the TV". But he does reckon that "whoever decided to put the disk on a serial interface needs shooting, it's so slow."

In fact Jeff is now incorporating a piece of German software into his tapes which speeds loading. Called Turbo, this tweaker allows tapes to be loaded faster than disks. The only snag is that the frequencies involved are so high that the best type duplication services have to be used. ▶



*Jeff with model camel — but one day there will be real llamas in the garden as well*

◀However, this has its advantages. As Jeff points out, "it will certainly hit software pirates".

The Laser Zone conversion was followed by Hover Bovver on the 64, with Jeff's tongue-in-cheek sense of humour growing ever stronger. In Hover Bovver you have to mow 16 lawns while avoiding the owner of the mower you've borrowed. The immaculate lawns at a hotel Jeff stayed in during a show inspired the game. Almost immediately he and his father devised most of the ideas for the frames, one of which features a lawn nicely tailored around the shape of a llama.

It was back to the llamas and the Vic 20 for the next game, Metagalactic Llamas Battle at the Edge of Time. As Jeff explains; "I usually go from a 64 game now to one on the Vic, and then back to the 64." So next up was Revenge of the Mutant Camels for the 64, launched at the end of last year.

As the name suggests this is a sequel to Attack of the Mutant Camels, which came out between Gridrunner on the 64 and Matrix. There's 42 phases in Revenge . . ., and each has to be played differently each time. Jeff thinks that this randomness is one of the features of his games. He argues: "You could teach a robot how to play games like Manic Miner on the Spectrum because each screen plays the same once you've mastered it." Although he adds that Manic Miner itself is "very well programmed".

## Ski-ing kangaroos

In Revenge . . . you, as the camel this time, face a range of adversaries. Among the cast of enemies and destructive weapons are mini and mutant, mutant camels; nuclear weapons (No Cruise is good news); ski-ing kangeroos; boulders and mutant cigarettes (Rock and roll-up); mountain goats ("from my holiday in Crete"); spontaneously exploding sheep; teapots pouring tea on you and toilets that flush down on you; and windsurfers ("I've done a lot of practical research into the number of ways a human can fall off a windsurf-board). All in all, it's a game "where everything turns into something else".

Revenge . . . will be followed by Hell Gate and then Jeff has his eyes on a 3D space game for the 64. He promises that "the new games will be at least as good as the old ones, probably better". Looking further into the future, he's keen on the new generation of sprite machines, giving high quality and easy-to-handle resoltuion — "you'll be able to see each hair on the llama's neck".

An extension has already been built onto Jeff's parents' house to handle his growing range of micros, battery of arcade stands, and collection of Peruvian exotica. He turned down an offer to move to the US "although the jacuzzis certainly tempted me". So the next step is a house of his own — and he vows that then there will be llamas in the back garden.■

# Amateur group with an international cast

*Organiser **David Ennal** introduces ICPUG, and invites Commodore users to make the most of its facilities*

AS THE name suggests, ICPUG (the Independent Commodore Products User Group) is an independent club catering for all those who own, have access to, or are interested in, a computer made by Commodore.

The club began in 1978 with only one machine to support, namely the Pet, and it was then known as the Independent Pet Users Group. Now, we cover all the other machines as well, such as the Vic 20, 64 and 700. This was reflected by the change of name last year.

ICPUG is a truly amateur club run by its officers, committee members and other enthusiasts in their spare time. In spite of this, or maybe because of it, the club has become renowned throughout Commodore circles worldwide. The quality and content of its newsletter is well known and the latest copy will often be seen in a prominent position on the desk of many a Commodore executive. Our technical experts are consulted by the computer press and recognised as a mine of reliable information concerning any of the machines.

The relationship between ICPUG and Commodore is one of the best existing between any user group and its associated manufacturer. This fact is highly prized by either side and information flows regularly both ways.

ICPUG publishes six newsletters a year packed with information, reviews, programs and hints concerning all things Commodore. It also runs a technical advice service, keeps a library of public domain software, supports an ICPUG slot on Prestel and Micronet, provides postal tuition courses in machine code, and mans stands at all large computer exhibitions such as the Pet Show, PCW Show and others throughout the UK.

ICPUG organises the setting up of local groups which now cover most areas of the country. We are interested in hearing from anyone who would like to start a new group — and funds are available to assist in this.

To see how many clubs there are just look at the list published alongside.

Anyone with any interest in Commodore computers should be a member of ICPUG. Membership is £7.50 a year (overseas from £11.00). Further details from the membership secretary, Jack Cohen, 30 Brancaster Road, Newbury Park, Ilford, Essex IG2 7EP.

**If you want your club mentioned on this page write to Clubnet, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD**

**Berkshire:** Brian Jones, Mathematics and Computing Department, Slough College of Higher Education, Wellington St, Slough, Berks. Telephone Slough 34585 ext 81, home (0734) 661494.

**Derbyshire:** Ray Davis, 105 Normanton Rd, Derby, Derbyshire. Telephone (0332) 41025. Meet at Derby Professional Colour, Osmaston Rd, Derby at 7.00pm.

**Dorset:** Bournemouth and Poole Independent Commodore Products User Group. Douglas Shave, chairman, 97 Canford Cliffs Rd, Poole, Dorset.

**Essex:** Walter Green, 151 The Hatherley, Basildon, Essex.

**Essex:** A G Surridge, 97 Shelley Rd, Chelmsford, Essex.

**Gloucestershire:** Mrs Janet Rich, Rose Cottage, 20 Old Court, Spring Hill, Cam, Gloucester, GL11 5PF. Telephone (0453) 47708. Meet informally at the above address on the last Friday of each month.

**Gloucestershire:** Mrs Alison Schofield, 78 Hesters Way Rd, Cheltenham. Telephone (0242) 580789 or (0242) 27588. Meet on the last Thursday of each month at Cheltenham Ladies College, Archway Entrance, St Georges St, Cheltenham.

**Hampshire:** Tony Cooke, 7 Russell Way, Petersfield, Hants, GU31 4LD. Telephone Petersfield 62840. Meet on the second Tuesday of each month at Bedales School, Petersfield at 7.30pm.

**Hampshire:** North Hants Regional Group. Ron Geere, 109 York Rd, Farnborough, Hampshire, GU14 6NQ. Meet every third Wednesday of each month at 70 Reading Rd, Farnborough, Hampshire.

**Hampshire:** Tony Cox, 10 Staplers Reach, Rowner, Gosport, Hampshire, PO13 0EY. Telephone Fareham 280530. Meet at Gosport Community Association, Bury House, Bury Rd, Gosport, Hants, PO12 3PX, at 7.00pm.

**Hertfordshire:** Hert/Stevenage Regional Group. Brian Grainger, 73 Minehead Way, Stevenage, Herts. Telephone (0438) 727925. Meet informally on the last Wednesday of each month at the Provident Mutual Assurance, Purwell Lane, Hitchin, Herts.

**Hertfordshire:** Herts/Watford Regional Group. Stephen Rabagliati, c/o Institute of Grocery Distribution, Grange Lane, Letchmore Heath, Watford, Herts. Meet on the second Monday of each month at the above address.

**Kent:** South East Regional Group. Wing Commander Mick Ryan, 164 Chesterfield Drive, Riverhead, Sevenoaks, Kent. Meet on the third and fourth Thursday of each month at Charles Darwin School, Jail Lane, Biggin Hill, Kent, at 7.30pm.

**Kent:** Ron Moseley, Rosemount, Lord Romney Hill Weavering, Maidstone, Kent. Telephone (0622) 37643. Meet on the first Wednesday of each month at 7.45pm.

**Lancashire:** David Jowett, 197 Victoria Rd East, Thornton-Cleveleys, Blackpool, Lancs. Meet every third Thursday at Arnold School, Blackpool. Telephone Cleveleys 86108.

**Lancashire:** John Ingham, 72 Ardwick St, Burnley, Lancashire, BB10 1BJ. Trying to form a Vic group.

**London:** Barry Miles, Business Studies Department, Polytechnic of North London, Holloway Rd, London W7. Pet group of the ACC which meets every other Tuesday at the Polytechnic at 6.00pm.

**London:** Michael Franks, 196 Castellain Mansions, Castellain Rd, London W9. Telephone 01-286 0650 or 01-839 7811.

**Merseyside:** Merseyside Commodore Users' Group. Jeff Jones, chairman, 41 Virginia Ave, Lydiate, Merseyside, L31 2NN. Telephone (051) 526 4813. Meet on alternate Wednesdays at Maghull Deyes High School, Liverpool, at 7.30pm.

**Middlesex:** Geoff Squibb, 108 Teddington Park Rd, Teddington, Middlesex. Telephone 01-997 2346.

**Norfolk:** Peter Petts, Bramley Hale, Wretton, Kings Lynn, Norfolk.

**Northumberland:** Graham J Saunders, Starling House, 22 Front St, Guide Post, Choppington, Northumberland. Telephone (0670) 823242.

**Oxfordshire:** Ian Blyth, 40 Wilmot Close, Witney, Oxon, OX8 7NL. Telephone Witney 5171 or 3671.

**Suffolk:** Alan Morris, 30 Kelso Rd, Bury St Edmunds, Suffolk. Telephone Bury St Edmunds 61870. Meet at The Coach House, Long Brackland, Bury St Edmunds, Suffolk.

**Surrey:** Arthur T Oram, 7 Box Ridge Ave, Purley, Surrey, CR2 3AR.

**Warwickshire:** Coventry and Warwickshire Commodore Computer Club. Will Light, 22 Ivybridge Rd, Styvechale, Coventry, Warwickshire. Telephone (0202) 413511. Meet at Stoke Park School and Community College, Coventry, on the fourth Wednesday of each month at 7.00pm, no meetings are held in July, August or December.

**West Midlands:** West Midlands Vic Users' Group. Joe Bowman, 6 The Oval, Albrighton, West Midlands. Meet monthly. Provides a free program library and advice on hardware and software. Send a large SAE for information.

**Yorkshire:** Bob Wood, 13 Bowland Cres, Ward Green, Barnsley, South Yorkshire. Telephone (0246) 811585.

**Northern Ireland:** David Bolton, 19 Carrickburn Rd, Carrickfergus, County Antrim, BT38 7ND, Northern Ireland.

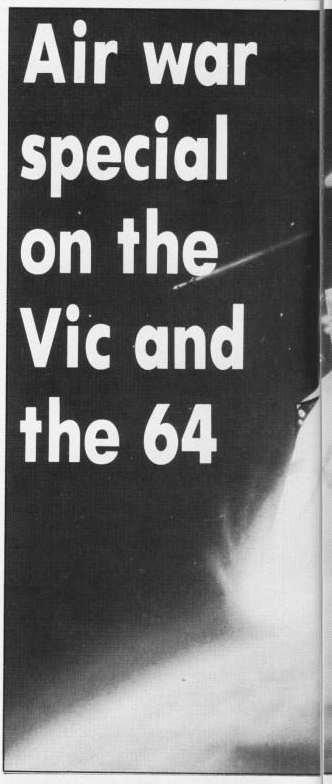
**Scotland:** Dr Jim MacBrayne, 27 Paidmyre Crescent, Newton Mearns, Glasgow, Scotland. Telephone (041) 639 5696.

**Scotland:** John Smith, 19 Brewlands Rd, Symington, Kilmarnock, Ayrshire, Scotland. Telephone (0563) 830407. Meet on the first and third Thursday of each month.

**Wales:** Simon Kniveton, Penpompren Hall, Talybont, Dyfed. Just forming.

**Wales:** F J Townsend, The Hill, Rhydowen, Llandyssul, Dyfed, SA44 4QD. Telephone (05455) 5291.

```
 0 REM
 1 REM ALIEN ATTACK
 2 REM
 3 REM BY J.R.WILSON
 4 REM
 5 REM ON VIC20 +16K RAM
 6 REM
 9 POKE 36878,15
 10 SC=256*PEEK(648)
 20 CL=37888
 30 IF SC<>4096 THEN CL=38400
 40 HS=0
 50 HS$="VIC"
 60 DIM X(30),Y(30)
 100 S=0
 110 SP=30
 120 XX=5
 130 D=1
 140 PRINT"■■■■■■■A L I E N■■■■■■■■A T T A C K"
 150 PRINT"■■■■■HIGH SCORE";HS
 160 PRINT"■■■BY ";HS$
 170 PRINT"■■■■■■■INSTRUCTIONS ?"
 180 GETA$
 190 IF A$="Y" THEN 5000
 200 IF A$<>"N" THEN 180
 500 C=0
 510 PRINT"■SCORE:";S
 520 FOR I=1 TO 30
 530 X(I)=3*INT(RND(1)*7)
 540 Y(I)=INT(RND(1)*30)+22
 550 NEXT
 560 YB=0
 570 CC=0
 1000 A=PEEK(203)
 1005 CC=0
 1010 IF A=33 THEN D=-1
 1020 IF A=26 THEN D=1
 1030 IF XX=0 THEN D=1
 1040 IF XX=21 THEN D=-1
 1050 POKESC+XX+22,32
 1060 XX=XX+D
 1070 POKESC+XX+22,83
 1080 POKE CL+XX+22,0
 1081 IF A=15 AND YB=0 THEN XB=XX:YB=2
 1090 C=C+1
 1100 IF C<=SP THEN 1140
 1110 C=1
 1120 IF Y(SP)=0 THEN SP=SP-1
 1130 IF SP<5 THEN SP=5
 1140 IF YB=0 THEN 1200
 1150 POKESC+XB+YB*22,32
 1160 YB=YB+1
 1165 IF YB=23 THEN YB=0:POKE36876,0:GOTO1200
 1170 K=PEEK(SC+XB+YB*22)
 1171 IF K=233 THEN YB=YB-1:XB=XB-1
 1172 IF K=160 THEN 2000
 1173 IF K=223 THEN YB=YB-1:XB=XB+1
 1180 POKESC+XB+YB*22,46
 1185 POKECL+XB+YB*22,6
 1186 POKE36876,230-YB*3
 1190 IF CC=0 THEN CC=1:GOTO1140
 1200 IF Y(C)<>0 THEN 1300
 1210 IF RND(1)>.2 THEN 1000
```



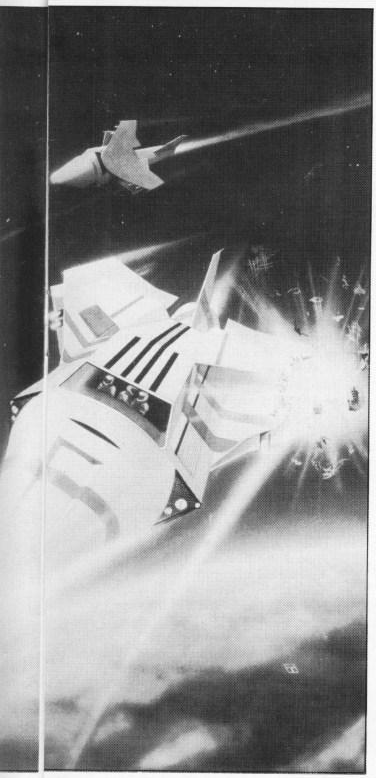

**STAR GAME**

# Alien Attack

*Destroy the aliens with* ***John Wilson***

ALIEN ATTACK is a games program for the Commodore Vic computer which requires more than the internal 5K RAM. The program was written on a Vic + 16K RAM pack, but it should work with a lower memory expansion. Before I go into how the program works, I will give a brief description of how to play the game.

You take control of a spaceship at the top of the screen and must defend your planet against the invading aliens. The alien fleet will appear at the bottom of the screen and



will slowly move towards you. Your ship is armed with a single laser cannon that can be fired downwards by pressing the RETURN key. As your ship is steered by navigation computers, it will continue to move in one direction until it reaches the edge of the screen, or you change direction. This can be accomplished by pressing Z to move left, or X for right.

To destroy an enemy ship, you must hit it in the middle, otherwise your laser bolt will bounce off the shielding covering the rest of the ship. As the alien ships only have short range weapons, they will only shoot when within range. Unfortunately, once fired, the enemy missile cannot be avoided, and your ship is destroyed. You gain points for destroying alien ships, but your score is reset to zero if you let any aliens through to your planet. As the game continues, the alien ships move faster and faster until they reach an incredible speed, and it is no longer possible to repel the fleet.

In order to play the game, you do not need to know how the program works, but for those who want to modify the program, I describe the main parts overleaf. ▶

```
1220 X(C)=3*INT(RND(1)*7)
1230 Y(C)=INT(RND(1)*15)+22
1300 A=Y(C)*22+SC+X(C)
1310 Y(C)=Y(C)-1
1315 IF Y(C)=2 THEN 3000
1317 IF Y(C)<15 AND X(C)+1=XX THEN 4000
1320 IF Y(C)>20 THEN 1000
1330 POKEA,32:POKEA+1,32:POKEA+2,32
1340 POKEA+22,32:POKEA+23,32:POKEA+24,32
1350 A=A-22:B=A-SC+CL
1360 POKEA,233:POKEA+1,160:POKEA+2,223
1370 POKEA+22,105:POKEA+23,102:POKEA+24,95
1380 POKEB,2:POKEB+1,2:POKEB+2,2
1390 POKEB+22,2:POKEB+23,2:POKEB+24,2
1400 GOTO 1000
2000 S=S+5
2010 FL=0
2020 FOR I=1TOSP
2030 IF X(I)+1=XB AND YB=Y(I) THEN FL=I
2040 NEXT
2050 A=SC+X(FL)+Y(FL)*22
2060 POKE36876,0
2070 POKEA,77:POKEA+1,66:POKEA+2,78
2080 POKEA+22,78:POKEA+23,66:POKEA+24,77
2090 FORI=1TO200:NEXT
2091 Y(FL)=0
2092 PRINT"■SCORE:";S
2095 YB=0
2100 POKEA,32:POKEA+1,32:POKEA+2,32
2110 POKEA+22,32:POKEA+23,32:POKEA+24,32
2120 GOTO 1200
3000 S=0
3010 PRINT"■SCORE:0          "
3020 POKEA,32:POKEA+1,32:POKEA+2,32
3030 POKEA+22,32:POKEA+23,32:POKEA+24,32
3040 Y(C)=0
3050 GOTO 1000
4000 FOR I=Y(C) TO 1 STEP-1
4001 A=PEEK(SC+XX+I*22)
4002 POKE36876,250-I*5
4010 POKESC+XX+I*22,90
4020 POKECL+XX+I*22,3
4030 FORJ=1TO100:NEXT
4040 POKESC+XX+I*22,A
4050 NEXT
4055 POKESC+XX+22,214
4056 POKECL+XX+22,4
4060 FOR I=1 TO 10
4070 POKESC+XX-I+22+I*22,255
4080 POKECL+XX-I+22+I*22,4
4090 POKESC+XX+I+22+I*22,127
4095 POKESC+XX+22+I*22,66
4100 POKECL+XX+I+22+I*22,4
4105 POKECL+XX+22+I*22,4
4106 POKE 36875,I*5+130
4110 FORJ=1TO100:NEXT
4120 NEXT
4130 FOR I=1 TO 10
4140 POKESC+XX+I+22+I*22,32
4145 POKESC+XX+22+I*22,32
4150 POKESC+XX-I+22+I*22,32
4160 FORJ=1TO100:NEXT
4170 NEXT
```

```
4180 POKE 36875,0
4190 POKE 36876,0
4200 PRINT"■■■YOU HAVE BEEN DESTOYED"
4210 PRINT"■■YOUR FINAL SCORE WAS"
4220 PRINT"■■";S;" POINTS."
4230 IF S>HS THEN 4500
4240 PRINT"■■■■ANOTHER GAME ?"
4250 GETA$
4260 IF A$="Y" THEN 100
4270 IF A$<>"N" THEN 4250
4280 PRINT"■■■■■■■■■BYE BYE."
4290 PRINT"■■■■■■■"
4300 END
4500 GETA$:IFA$<>"" THEN 4500
4510 PRINT"■■THIS IS THE HIGHEST"
4520 PRINT"■SCORE SO FAR. ENTER"
4530 PRINT"■YOUR NAME:";
4540 INPUT HS$
4545 HS=S
4550 GOTO 4240
5000 PRINT"■■■■■■ALIEN ATTACK"
5010 PRINT"■■■■■■"
5020 PRINT"■■■■DEFEND YOUR PLANET"
5030 PRINT"FROM THE INVADING"
5040 PRINT"ALIENS. YOU CONTROL"
5050 PRINT"THE TOP OF THE SCREEN"
5060 PRINT"AND MUST STOP THE"
5070 PRINT"ALIENS FROM REACHING"
5080 PRINT"THE TOP. 5 POINTS ARE"
5090 PRINT"GAINED FOR EACH ALIEN"
5100 PRINT"DESTROYED, BUT YOU"
5110 PRINT"LOSE YOUR SCORE IF AN"
5120 PRINT"ALIEN REACHES THE TOP."
5130 PRINT"■■■■TO DESTROY AN ENEMY"
5140 PRINT"■YOU MUST GET A DIRECT"
5150 PRINT"HIT ON THE CENTRE.ANY"
5160 PRINT"OFF-CENTRE HITS WILL"
5170 PRINT"BE REFLECTED OFF THE"
5180 PRINT"SHIELDS."
5190 PRINT"■■■■■■HIT A KEY"
5200 GETA$
5210 IF A$="" THEN 5200
5220 PRINT"■■■■■THE ALIENS WILL"
5230 PRINT"SHOOT AT YOU IF THEY"
5240 PRINT"COME WITHIN RANGE OF"
5250 PRINT"YOUR SHIP. TO MOVE THE"
5260 PRINT"■SHIP, USE THE THESE"
5270 PRINT"KEYS:  Z    LEFT"
5280 PRINT"       X    RIGHT"
5290 PRINT"    RETURN  FIRE"
5300 PRINT"■■■■YOUR SHIP WILL MOVE"
5310 PRINT"■IN ONE DIRECTION UNTIL"
5320 PRINT"■YOU CHANGE TO THE NEW"
5330 PRINT"DIRECTION OF MOVEMENT"
5340 PRINT"OR YOU BOUNCE OF THE"
5350 PRINT"SIDES OF THE SCREEN."
5360 PRINT"■■■■■■■■■HIT A KEY"
5370 GETA$
5380 IF A$="" THEN 5370
5390 PRINT"■"
5400 GOTO 500
```

**Program notes**

| | |
|---|---|
| 9 | Set volume to maximum |
| 10 to 30 | Find position of screen and colour memory |
| 40 to 50 | Reset high score |
| 100 to 130 | Set up initial variables for each game |
| 140 to 160 | Print title and high score |
| 170 to 200 | Print instruction if this is required |
| 500 to 570 | Set up variables for next wave |
| 1000 to 1080 | Your movement |
| 1081 | Your firing |
| 1090 to 1100 | Find next alien to move |
| 1110 to 1130 | Increase speed of aliens |
| 1140 to 1190 | Move your laser bolt |
| 1200 to 1230 | Add a new alien to the fleet |
| 1300 to 1400 | Move alien ship |
| 2000 to 2120 | Destroy alien ship |
| 3000 to 3050 | Alien reaches top of screen |
| 4000 to 4050 | Alien shoots at you |
| 4055 to 4190 | Explosion routine |
| 4200 to 4220 | Print final score |
| 4240 to 4300 | Play another game, if required |
| 4500 to 4550 | Your score is the highest |
| 5000 to 5400 | Print instructions |

**Variables**

| | |
|---|---|
| SC | Pointer to start of screen memory |
| CL | Pointer to start of colour memory |
| HS | Highest score so far |
| HS$ | Person who got that score |
| X(30) | X-positions of enemy fleet |
| Y(30) | Y-positions of enemy fleet |
| S | Your score so far |
| SP | Number of alien ships in the fleet |
| XX | Your x-position |
| D | Your direction of movement |
| A$ | General input |
| C | Counter to show which ship is to move next |
| I | General looping |
| YB | Y-position of laser bolt |
| CC | Flag for laser 'bounce' |
| A | Keyboard input |
| XB | X-position of laser bolt |
| K | Contents of a given screen location |
| FL | Flag showing which alien has been hit |
| J | General looping |

# Plane

*High flying on the 64 with* ***A Cope***

PLANE IS written for the Commodore 64 and the object of the game is to shoot the plane as many times as possible before it reaches the ground and your game is over. The program should be saved before you run it.

**Program notes**

| | |
|---|---|
| 0-44 | Titles and instructions |
| 45-103 | Set up variables |
| 150-500 | Game movements, etc |
| 600-630 | Ending and re-run |
| 700-640 | Firing routine |
| 1000-1001 | No need to type these lines |
| 2000 | Graphics set up |

```
0 REM ********************************
1 REM *                              *
2 REM * COPYRIGHT (C) 1983  A . COPE *
3 REM *                              *
4 REM *  PLANE IS A GAME FOR CBM 64  *
5 REM *                              *
6 REM ********************************
7 REM
8 REM  NOT FOR USE WITH SIMONS BASIC !
9 REM
10 POKE53280,14:POKE53281,0
20 PRINT"■■■
```

# Simple steps to sprite movement

*Setting up sprites and then moving them around —*
***Kevin Bergin** explains how*

THIS ARTICLE is aimed at describing a few of the many ways of defining and handling sprites from user written programs. Included is a short program that sets up and moves sprites around the screen.

There are many sources of learning how to use the capabilities of your 64. The most obvious is to read magazines such as this one, although magazines are of course limited by the amount of space available. If you wish to use sprites quickly and easily and have no desire to know much about the way the 64 handles the information then one of the many sprite editors currently available would be a good buy.

For those who do not have money to throw away and wish to understand more about sprites, there are two books currently available which cover sprites adequately. One is *Using the 64* written by Pete Gerrard and published by Duckworth (£6.95). This is an excellent book and covers all aspects of the 64. The other book is *The Commodore Programmer's Reference Guide* which is available from Commodore. Both of these books are very useful in general and of particular help with sprites. The program included here will only cover some aspects of sprite use, but one of the two books mentioned will add the rest of the information.

The program included here uses four sprites setting up two characters and moving them around the screen. The sprites are set up in two different ways so as to

```
10 PRINT"[CLR][13 CD][BLK]       PLEASE WAIT A MINUTE......."
20 V=53248
30 POKEV+32,15
40 POKEV+33,14
50 PRINT"[BLU]"
60 POKEV+21,255
70 POKEV+28,3
80 POKEV+39,6
90 POKEV+40,2:POKEV+41,7:POKEV+42,7
100 POKEV+37,14
110 POKEV+38,0
120 POKE2040,13
130 POKE2041,13
140 FORI=0TO62
150 READX
160 POKE832+I,X
170 NEXTI
180 GOSUB820
190 GOSUB940:PRINT"[CLR]"
200 FORX=0TO255
210 POKEV+1,50:POKEV+0,X
220 POKEV+2,50:POKEV+3,X
230 NEXT
240 POKEV+0,0:POKEV+1,0
250 P=192
260 FORX=0TO255
270 POKEV+4,X:POKEV+5,X
280 POKE2042,P
290 P=P+1:IFP>193THENP=192
300 NEXT
310 PRINT"[CLR][13 CD]   'A' TO FINISH OR 'B' TO S
EE AGAIN"
320 GETA$:IFA$<>"A"ANDA$<>"B"THEN320
330 IFA$="B"THENPRINT"[CLR]":GOTO200
340 POKEV+21,0:POKEV+32,14:POKEV+33,6:PRINT"[CLR]
";CHR$(154)
350 END
360 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
370 DATA3,255,255,0,2,0,192,170,128,194,150,80
380 DATA234,150,80,194,170,168,192,170,168,0,32,1
28,0,170,160
390 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
400 DATA"    11          11          "
410 DATA"   1111   111   1111   11    "
420 DATA"   1111 11111 1111 1111   "
```

demonstrate different defining methods.

Now for a brief look at the program. The first line clears the screen and prints a message in black. The variable 'V' is set to 53248 in line 20, which is the start of the sprite x and y registers. All of the work with sprites can be done using 53248 as a base address and adding the appropriate offset. Line 30 sets the border colour and line 40 sets the screen colour. Line 50 prints in blue and line 60 sets the sprite display register for all sprites to be displayed. If this address is set to 0 the sprites are turned off.

Line 70 sets the register to select multicolour and lines 80 and 90 select the colours for each sprite. Lines 100 to 110 set and select multicolour for the sprites. Any sprite data is called by the 64 giving it a pointer. The sprite pointers are from location 2040 to 2047 — for example the pointer for location 2040 would tell the 64 where to find the data for sprite 0. The way to calculate the values to be POKEd into these locations is:

64*(n)

therefore if sprite 0 is to be placed starting at location 832 (the cassette buffer) then (n) would be 13.

Lines 120 and 130 place the data for sprite 0 and sprite 1 at location 832. The loop in lines 140 to 170 reads in the data for sprite 0 and sprite 1 and POKEs it into the cassette buffer. The two branches on lines 180 and 190 set up sprite 2 and 3 then clear the screen. The loop from line 200 to 230 moves sprite 0 and sprite 1 across and down the screen. Line 240 places both sprite 0 and 1 off the screen.

### Simple but effective

The variable 'P' is set to 192 in line 250 (192 is the pointer for sprite 3. 64*192=12288 and 193 is the pointer for sprite 4). In the loop from line 260 to 300 the two sprites are moved across the screen, but at each pass through the loop the sprites are swapped. This is a simple but effective way of achieving animation. Lines 310-350 contain a routine to finish or start again.

The data for sprites 0 and 1 is in lines 360 to 390. The data for sprite two is in lines 400 to 600 and the data for sprite 3 is in lines 610 to 810. The last two routines read the data for sprites 2 and 3 and convert it into the correct values before POKEing them into memory, starting at location 12288 for sprite 2 and location 12352 for sprite 3. This technique is explained and documented in the Commodore reference guide. The advantage of this technique is that the user simply draws the sprite on the screen and the 64 does the rest of the work. The disadvantage is the time the 64 takes to do this — as will be seen by trying this program.

Of the sprite facilities not mentioned here the most important is collision detection and priority. Collision detection is set using locations 53273 (bit 2 is sprite to sprite and bit 1 is sprite to background). Location 53275 sets the sprite to background priority. The other technique that needs some thought concerns the expansion of sprites. The vertical expansion is set by location 53271 and the horizontal expansion is set by location 53277.■

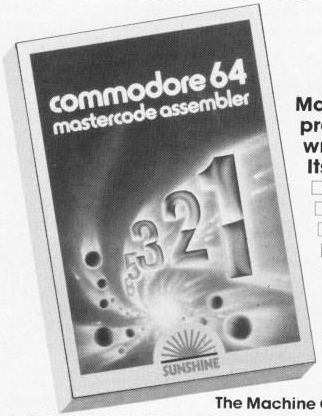
```
430 DATA"    111111111111 111111  "
440 DATA"     111   1   111 11111111"
450 DATA"         1111111       11    "
460 DATA" 111    11111         11    "
470 DATA"11111    111        11 11    "
480 DATA"111111   111         111     "
490 DATA" 11  111111111     11       "
500 DATA"        111111111111        "
510 DATA"         11111   111        "
520 DATA"        1111111              "
530 DATA"        1111111              "
540 DATA"        1111111              "
550 DATA"         11111               "
560 DATA"         11 11               "
570 DATA"         11 11               "
580 DATA"         11 11               "
590 DATA"       1111 1111             "
600 DATA"      11111 11111            "
610 DATA"    11          11           "
620 DATA"   1111   111   1111   11    "
630 DATA"   1111 11111 1111 1111    "
640 DATA"    111111111111 111111  "
650 DATA" 11 111   1   111 11111111"
660 DATA"1111   1111111          11    "
670 DATA" 1111   11111           11    "
680 DATA"  111    111        11 11    "
690 DATA"    11   111         111     "
700 DATA"     111111111     11       "
710 DATA"       111111111111        "
720 DATA"        11111   111        "
730 DATA"       1111111              "
740 DATA"       1111111              "
750 DATA"       1111111              "
760 DATA"        11111               "
770 DATA"        11 11               "
780 DATA"        11 11               "
790 DATA"        11 11               "
800 DATA"       1111 1111            "
810 DATA"      11111 11111           "
820 REM SPRITE 2
830 FORI=0TO20
840 READA$
850 FORK=0TO2:T=0
860 FORJ=0TO7:B=0
870 IFMID$(A$,J+K*8+1,1)="1"THENB=1
880 T=T+B*2^(7-J)
890 NEXT
900 POKE12288+I*3+K,T
910 NEXT
920 NEXT
930 RETURN
940 REM  SPRITE 3
950 FORI=0TO20
960 READA$
970 FORK=0TO2:T=0
980 FORJ=0TO7:B=0
990 IFMID$(A$,J+K*8+1,1)="1"THENB=1
1000 T=T+B*2^(7-J)
1010 NEXT
1020 POKE12352+I*3+K,T
1030 NEXT
1040 NEXT
1050 RETURN
```

SUNSHINE

# Mastercode Assembler

## for the Commodore 64

### Full Commodore 64 Assembler/ Disassembler




**£14.95** inc VAT

**Mastercode is a substantial and complex program of use to anyone interested in writing machine code on the Commodore 64. Its features include:**

- ☐ Machinecode monitor
- ☐ File Editor
- ☐ Disassembler
- ☐ Assembler

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# Two's complement: turning positive numbers to negative

*"Two's complement" may sound like a misheard cliche but it is in fact an important mathematical concept, used for integers on the Vic, as* ***Boris Allan*** *explains*

IF THE TIME is now two o'clock, then five hours ago the time was nine o'clock. In ordinary arithmetic 2–5 = 9.

The world, and most of its machines, follow clock arithmetics. To turn through an angle of 450 degrees is to turn to the direction 90 degrees from one's original direction, 366 days from now is tomorrow's date (but a different year), unless there is a leap year. On a car's mileometer, one mile on from 999999 is 000000 (as 1000000 is too large to fit on the dial).

### Only a machine

A computer is only a machine, and a computer can only repeat itself. The basic element on the Vic 20 (and it can only repeat itself) is a byte. A byte takes values from 0 to 255, and (for example) 255 + 1 = 0 and 2–5 = 253. A byte works in clock arithmetic to a base of 256, as there are 256 different numbers from 0 to 255.

On the Vic we can inspect the contents of bytes by the PEEK command, and if we

PRINT PEEK(X)

where X is the number of a location (its address in memory), then we print out the value of the number stored in location X. The command to put a value into a location is POKE, and

POKE X, N

will enter the value of N into the location X.

Trying different values for N reveals that it is not possible to POKE values of N less than 0 or more than 255 (though this is possible on some other computers). As a byte contains eight bits, we can investigate the characteristics of a byte by "simulating" (that is, "copying") the behaviour of an eight bit byte.

Eight bits form a binary number, where the bits are numbered from right to left. The rightmost bit is normally known as bit 0, and the leftmost bit is usually known as bit 7. Each bit has a different weighting in the formation of the value from that binary number:

| *Bit* | *Weight* |
|---|---|
| 0 | 1 |
| 1 | 2 |
| 2 | 4 |
| 3 | 8 |
| 4 | 16 |
| 5 | 32 |
| 6 | 64 |
| 7 | 128 |

For example, 11000110 as a binary number is equivalent to 128 + 64 + 0 + 0 + 0 + 4 + 2 + 0 as a denary (or decimal) number, or 198. As can easily be found, when all the bits are equal to one the denary value is 255.

Enter the program published with this article. Run the program, and, to the request for the input number, enter 198. The program's response is to print the values 198 and 11000110, and — as the binary equivalent of the denary 198 is 11000110 — we obviously have a program to convert denary numbers into binary equivalents.

The operation of the program is fairly simple, the denary number is input and stored in variable V. The number V is then copied into variable N, variable A is set to zero, and variable A is set to one. Variable A is going to contain the representation of the binary number (digit by digit) and variable T will give the position of the digit.

### Looping

We go through the loop eight times, and the first task is to find out whether the number is odd, or even. If the number is odd then there is a bit equal to one in the rightmost position, and if the number is even the rightmost bit is zero. Function FNO(Y) gives the result 1 if the number is odd, and the result 0 if the number is even. FNO(Y), therefore gives the value of the right most bit.

Suppose we are going through the loop for the first time. The variable B is now equal to the value of the rightmost bit, the variable A has the value zero, and T has the value one. The assignment to A, by A = A + B*T, gives A the value of B.

T is now made 10 times larger, and the value of the variable N is halved by FNH(Y), with no remainder (as a result of the INT operation in FNH(Y)). Half of the binary number 11101 is 1110, and half of 100010 is 10001, so by halving the number (and ignoring the remainder) we have produced a new binary number moved along one position.

At the next activation of the loop, we find if the new binary number is even or odd (ie is the new rightmost bit zero or one?). We store that bit value in A, by adding B*T to A. T is now 10 times greater than before, and thus the bit value appears as the next digit along in the denary number A.

The binary appearing value which appears at the end of the program is, in fact, an ordinary denary number which we pretend is a binary number. When we have evaluated eight bits we end, even though the number may be greater than 255.

### Four down

Here are a succession of values to try

1
254
255
256
1000

to which the results for the first three are not that interesting. The fourth value (ie 256) is interesting, as an eight bit binary number it is 00000000, or 0. The number 1000, as an eight bit binary number, is 11101000.

In this special byte arithmetic, of eight bits,

255 + 1 = 256 = 0 (as a binary number)

and, as we all know, in ordinary arithmetic to produce zero you have to write

–1 + 1 = 0

Does these mean that –1 is the same as 255, for eight bit binary numbers? Try –1, and you see that it is 11111111, and as you remember 255 (as an eight bit binary number) is 11111111. Try –2, and the result is 11111110. Amazing?

The leftmost bit for –1 and –2 is equal to one, and this is commonly known as the "sign" bit in the special form of arithmetic. This special form of arithmetic is called "two's complement" arithmetic, and ▶

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```
0 REM PROGRAM 1
10 FNH(Y) = INT(Y/2)
20 FNO(Y) = Y - 2*FNH(Y)
100 INPUT V
110 N = V
120 A = 0
130 T = 1
200 FOR I=1 TO 8
210 B = FNO(N)
220 A = A + B*T
230 T = T*10
240 N = FNH(N)
250 NEXT I
300 PRINT
310 PRINT V, A
320 GOTO 100
READY.
```

*Run this program and, to the request for the input number, enter 198*

◀ is used for integers on the Vic.

The reason why two's complement arithmetic is so important becomes clear when you realise that computers can only store "positive" values. When we perform calculations we need both positive and negative numbers, and so we have to find some way of treating certain positive numbers as if they were really negative numbers.

The 6502 processor, which the Vic uses, has a special "sign" flag, which is set by reference to bit 7 in the accumulator, and though not all computers use two's complement arithmetic, most do.

### Values

First, however, work out when a positive number becomes a negative number. 127 as an eight bit binary number is (try it) 01111111, though note that on the Vic the first zero is missing. The denary number 128 is 10000000 and thus has a sign bit set to one, so 128 must not be 128, but be some negative number (just as 255 is –1). If you enter –128, then you find that it is 10000000.

Now integers on the Vic take values between –32768 and 32767. Integers are stored in two bytes, and as a sixteen bit binary number –32768 is 1000000000000000, and the denary number 32767 is 0111111111111111. Integers on the Vic are stored according to the two complement convention.

### Losing

Two's complement also explains about the INT function, enter

PRINT INT(3.5), INT (–3.5)

and the results are 3 and –4. The INT function always rounds down in value, and not towards zero. Now try

PRINT INT (–1/2), INT (1/2)

to which the results are –1 and 0. The explanation of the latter pair enlightens all other INTs.

As an eight bit binary number, the denary number 1 is equal to 00000001 and, to divide by two, we "lose" off the last bit (ie the rightmost bit). To keep it as an eight bit number, we add in an extra zero on the left: we produce 00000000 (as in the print statement above).

The denary number –1 is (as a two's complement number of eight bits) 11111111. To divide by two we lose the rightmost bit, and this leaves us with a seven bit number. To make the number up to eight bits, we have to add another bit at the left. As the number is negative, we have to keep the sign bit correct, and so we enter a one at the left. This gives 11111111, which is (as we know) equal to –1.

Now try to

PRINT 3 = 3, 3 = 4, NOT(2)

and you will find –1, 0 and –3. Start with the last first. As a binary number, 2 is 00000010 and –3 is 11111101. If the last two binary numbers are compared, it can be seen that they are very similar: where there is a bit value 1 in the first there is a bit value of 0 in the other, and vice versa.

### Flipping

The NOT function acts at the level of bits, and flips each bit (zero to one, and vice versa). This is why NOT(2) is –3, and NOT(32767) is –32768.

If something is "true", such as 3 = 3, then the Vic prints out –1. The binary equivalent of –1, remember, is 11111111 — that is, all bits are "true". When all bits are 'false", then the number is 00000000, or — in denary — 0.

There is another way of storing positive and negative numbers, known as "one's complement" arithmetic. In this form of arithmetic a negative number is again indicated by the sign byte being one, but the rest of the number differs from the two's complement version.

If the positive version of the number X has the binary value 00001111, then the binary equivalent of –X is 11110000. The one's complement form is produced by taking the positive number, and flipping the value of every bit. This is exactly the opration performed when we find NOT(X).

To form a two's complement number we read in many places that the bits in the number have to be flipped, and one added to the result. In other words, to form a two's complement number, we first produce a one's complement form and then add one to the two's complement form.

Try this

PRINT NOT(3) + 1, 1 + NOT 3

to which the answers are –5 and –3. The function NOT does not expect the following value to be in parentheses, and it finds the one's complement of (3) + 1 (which is, of course, –5). The second item in the print list is thus how to find the two's complement version 3. The value 1 is added to the one's complement form of 3 (which is –4), to produce the two's complement result (ie –3).

The Vic many checks on what it is possible to perform with two's complement integers. To enter

I% = 32767 + 1

is to produce an ?ILLEGAL QUANTITY ERROR. In our eight byte arithmetic, 127 + 1 = 128, and if we turn those values into two's complement versions, 127 + 1 = –128. There need to be a whole series of checks on admissable values, so that errors such as 32767 + 1 = –32768 do not occur. ■

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# Scan those keys

*Specifying which keys should be valid during input from the keyboard is not too difficult — **Adrian Warman** explains how overleaf*

```
1000 033C            ! KEY SCAN PROGRAM
1010 033C            !
1020 033C            ! ONLY PERMITS THE RETURN OF THOSE
1030 033C            ! KEYS STORED IN KEY$.
1040 033C            !
1050 033C            ! ALL OTHER KEYS ARE IGNORED.
1060 033C            !
1070 033C            !
1080 033C            ! ASSUMES A CALL BY THE 'USR(X)'
1090 033C            ! FUNCTION, WHERE 'X' IS A DUMMY
1100 033C            ! ARGUMENT. THE VALUE RETURNED IS
1110 033C            ! THE ASCII CODE OF THE KEY FOUND.
1120 033C            !
1130 033C            ! IF KEY$ DOES NOT EXIST, OR HAS NO
1140 033C            ! CHARACTERS, THEN THE NULL$
1150 033C            ! I.E. CHR$(0) IS RETURNED.
1160 033C            !
1170 033C            !
1180 033C            ! USES LOCATIONS $FB & $FC FOR INDEXING
1190 033C            !
1200 033C            ! LOCATION $FD WILL BE USED TO STORE
1210 033C            ! THE NUMBER OF CHARACTERS IN KEY$
1220 033C            ! (IF IT IS FOUND).
1230 033C            !
1240 C000           *=$C000
1250 C000            !
1260 C000            ! TRY AND FIND KEY$
1270 C000            !
1280 C000            ! GET START OF VARIABLE STORAGE
1290 C000            !
1300 C000           VARTAB      =  $002D
1310 C000           ARYTAB      =  $002F
1320 C000           FREKZP      =  $00FB
1330 C000           GETIN       =  $FFE4
1340 C000            !
1350 C000 A52D                  LDA VARTAB
1360 C002 85FB                  STA FREKZP
1370 C004 A52E                  LDA VARTAB+1
1380 C006 85FC                  STA FREKZP+1
1390 C008            !
1400 C008            ! ARE THERE ANY (MORE) VARIABLES TO TEST ?
1410 C008            ! CHECK HI BYTES. END OF VARS CANNOT
```

```
1000 PRINT "LOADING KEYSCAN PROGRAM"
1010 :
1020 REM S=START ADDRESS OF PROGRAM.
1030 REM TO RELOCATE, SIMPLY CHANGE
1040 REM THE VALUE OF S.
1050 S=49152
1060 FOR H=S TO S+110 STEP 16
1070 T=0
1080 FOR L=0 TO 15
1090 READ DAT
1100 T=T+DAT
1110 POKE H+L,DAT
1120 NEXT L
1130 READ TL
1140 IF TL<>T THEN PRINT "SUM ERROR IN";INT((H-S)/1.59)+1230
1150 NEXT H
1160 :
1170 REM SET UP THE 'USR' VECTOR.
1180 POKE 785,S-INT(S/256)*256
1190 POKE 786,INT(S/256)
1200 PRINT "JOB DONE"
1210 :
1220 :
1230 DATA 165,45,133,251,165,46,133,252,165,252,197,48,208,6,165,251, 2482
1240 DATA 197,47,240,51,160,0,177,251,41,128,240,15,24,165,251,105, 2092
1250 DATA 7,133,251,165,252,105,0,133,252,144,221,200,177,251,170,41, 2502
1260 DATA 128,240,233,138,201,197,208,228,136,177,251,201,75,208,221,200, 3042
1270 DATA 200,177,251,201,0,208,5,169,0,168,240,31,133,253,200,177, 2413
1280 DATA 251,72,200,177,251,133,252,104,133,251,32,228,255,240,251,164, 2994
1290 DATA 253,136,48,246,209,251,208,249,168,169,0,108,5,0,0,162, 2212
```

*First of all Keyscan has to be loaded into memory — using this Basic loader program*

```
1420 C008          ! BE LESS THAN START OF VARS, SO
1430 C008          ! ONLY REQUIRED TO CHECK LO-BYTES
1440 C008          ! IF HI-BYTES ARE EQUAL.
1450 C008          !
1460 C008 A5FC     CHECK       LDA FREKZP+1
1470 C00A C530                 CMP ARYTAB+1
1480 C00C D006                 BNE OKVARS
1490 C00E          !
1500 C00E          ! CHECK LO-BYTES
1510 C00E          !
1520 C00E A5FB                 LDA FREKZP
1530 C010 C52F                 CMP ARYTAB
1540 C012 F033                 BEQ NOVARS
1550 C014          !
1560 C014          ! OK, THERE ARE VARIABLES TO TEST.
1570 C014          !
1580 C014 A000     OKVARS      LDY #$00
1590 C016          !
1600 C016          ! PREPARE TO TEST THIS VARIABLE FOR
1610 C016          ! IDENTITY - IS IT AN INTEGER ?
1620 C016          !
1630 C016 B1FB                 LDA (FREKZP),Y
1640 C018 2980                 AND #%10000000
1650 C01A F00F                 BEQ NOTINT
1660 C01C          !
1670 C01C          ! IT MUST BE AN INTEGER - SKIP TO
1680 C01C          ! NEXT VARIABLE BY 7 LOCATIONS.
1690 C01C          !
1700 C01C 18       SKIPNUM     CLC
1710 C01D A5FB                 LDA FREKZP
1720 C01F 6907                 ADC #$07
1730 C021 85FB                 STA FREKZP
1740 C023 A5FC                 LDA FREKZP+1
1750 C025 6900                 ADC #$00
1760 C027 85FC                 STA FREKZP+1
1770 C029          !
1780 C029          ! HAVING STEPPED OVER THIS VARIABLE,
1790 C029          ! GO AND TEST FOR MORE VARIABLES TO
1800 C029          ! BE CHECKED.
1810 C029          !
1820 C029 90DD                 BCC CHECK
1830 C02B          !
1840 C02B          !
1850 C02B          ! VARIABLE FOUND WAS NOT AND INTEGER
1860 C02B          ! SO WAS IT A REAL ?
1870 C02B          !
1880 C02B C8       NOTINT      INY
1890 C02C B1FB                 LDA (FREKZP),Y
1900 C02E          !
1910 C02E          ! PRESERVE IT FOR POSSIBLE LATER CHECK
1920 C02E          !
1930 C02E AA                   TAX
1940 C02F 2980                 AND #%10000000
1950 C031          !
1960 C031          ! IF THE RESULT IS ZERO, THEN A REAL
1970 C031          ! HAS BEEN FOUND, SO SKIP OVER IT.
1980 C031          !
1990 C031 F0E9                 BEQ SKIPNUM
2000 C033          !
2010 C033          !
2020 C033          ! A STRING HAS BEEN FOUND, SO TEST
2030 C033          ! FOR THE LETTERS 'K' & 'E'.
2040 C033          ! 'E' IS TESTED FIRST, BECAUSE ALREADY
2050 C033          ! AT THE CORRECT POSITION. IN STRINGS,
2060 C033          ! BIT 7 OF THE SECOND LETTER IS SET,
2070 C033          ! SO A COMPARISON IS MADE WITH THE
2080 C033          ! REVERSE 'E' CHARACTER.
2090 C033          !
2100 C033          ! RELOAD CHARACTER TO TEST IT
2110 C033          !
2120 C033 8A                   TXA
2130 C034 C9C5                 CMP #$C5
2140 C036          !
2150 C036          ! IF NOT KEY$, STEP OVER IT
2160 C036          !
2170 C036 D0E4                 BNE SKIPNUM
2180 C038          !
2190 C038          !
2200 C038          ! SECOND LETTER OF STRING WAS AN 'E',
2210 C038          ! WHICH IS A GOOD CHECK, BUT NOW TEST
```

I HAVE BEEN programming microcomputers for several years now, and during that time have found many annoying flaws in their operation, especially when using Basic. One of the more obvious of these is the inability of Basic to permit easy specification of which keys are valid during input from the keyboard.

In other words, there is no easy way of telling the computer that certain key presses should be ignored. Using Commodore Basic, it is possible to use the GET statement; but this takes a disproportionate amount of time as the number of valid keys increases, and further suffers from susceptibility to the Stop key. I decided, therefore, to write a simple-to-operate utility program for the CBM 64 in machine code, that could be called from Basic with ease. In the remainder of this description, the program is referred to by the name Keyscan.

Keyscan communicates with Basic via three "channels":
(1) Information is given to the routine in a string KEY$ (can be abbreviated to KE$).
(2) The routine is initiated by the USR function, with a dummy argument (in a similar fashion to FRE and POS).
(3) The return to Basic is made with an integer value representing the ASCII code of the (valid) key found — with a special error case.

### Simplicity

Keyscan is simple to use. First of all, it must be loaded into the computer's memory. This can be achieved using the supplied Basic loader program. Keyscan is completely relocatable, consequently although the loader program places Keyscan into the unused RAM at $C000, the user can store Keyscan in (for example) the cassette buffer by changing the value of variable S in line 1050 of the loader to read S = 828. Use common-sense when moving Keyscan. If you put it in the cassette buffer, then load a program from tape, Keyscan will be overwritten; almost certainly causing a crash when next invoked.

Once loaded, the USR vector must be modified to point to Keyscan. This is quite simple, and is demonstrated in lines 1180 to 1190 of the loader. Thereafter, Keyscan can be called using the USR function.

As listed above, Keyscan needs to know which keys to search for. This is done by creating KEY$. Put simply, KEY$ is a string which contains all the valid characters to be searched for. Any keys not in KEY$ will be ignored during the scan. The default is to ignore the Stop key (which in fact *can* be included by using CTRL and C while entering the string, in an identical fashion to changing text colours).

There is plenty of protection to make Keyscan relatively friendly. If you forget to define KEY$ (Keyscan cannot find KEY$), or if KEY$ has no characters in it (eg, KEY = " "); then Keyscan will return to Basic immediately with code 0(ASCII NUL). In the worst possible case, you may forget which keys are legal, but you can break out of Keyscan using the Warm Start (RUN/STOP-RESTORE).

Having defined KEY$, the user can call Keyscan by the USR function. Any argument supplied (eg USR (0)) will be ignored by Keyscan. Keyscan will then wait until a valid key is pressed on the keyboard; whereupon it will return to Basic with the ASCII code of that key. This is all demonstrated in the example program, which simply tests for the keys A, B, C, D and X; ignoring all other keys. The example program will finish when X is pressed.

```
10 KEY$="ABCDX"
20 IN$=CHR$(USR(0))
30 IF IN$="X" THEN GOTO 90
40 :
50 PRINT
60 PRINT "YOU PRESSED: ";IN$
70 GOTO 20
80 :
90 PRINT "END"
```

*Basic example program*

A fully annotated assembly listing is provided, and is summarised here. Lines 1300-1380 define the variables used by Keyscan. Whenever reference is made to System variables or Kernal Routines, the official name (as supplied in the *CBM 64 Programmer's Reference Guide)* is used to increase the clarity.

In lines 1460-1540 Keyscan must search for KEY$. A scan is made through the Basic variables, and when a variable is found, it is tested to see if it is KEY$. If no more variables are found, Keyscan returns to Basic.

When a variable is found, certain checks are made. The first is "Is it an Integer?" (lines 1580-1650). If a useless variable is found, it must be stepped over, by lines 1700-1820. Lines 1880-1990 test if this variable is real, and if so will skip over it.

In order to be in lines 2120-2270 a string must have been found. Checks are now made to see if it is KEY$. Lines 2430-2450 must be KEY$, so a last check is made to make sure that there actually some characters to search for, to prevent the routine from "hanging".

Having found a valid KEY$, certain data must now be obtained: where is the string stored, and how many characters are there to search for (lines 2510-2590)? The computer now waits (lines 2650-2820) for the user to type a key. When entered, the key is compared with those in KEY$ until a match is found. When the match is found, the ASCII value is calculated (lines 2890-2960). To return a value to Basic, the Integer to Floating Point routine is used.

Hopefully the above notes used in conjuction with the Assembly listing should make modification fairly easy to achieve. As an example, the user may wish to alter the string variable used by Keyscan from KEY$ to one of his own choice. This could be arranged quite simply by changing the ASCII codes stored at $C035 and $C03C.

Note that because of the way Keyscan is written, and also because of the way Basic recognises variables, the first letter of a string variable name is stored as its ASCII value (hence the data at location $C03C); *But* the second character is stored as the ASCII value *with Bit 7 set.* This is why the data for a "reversed" letter E is stored at location $C035.■

```
2220 C03B          ; FOR THE FIRST LETTER AS A 'K'
2230 C03B          ;
2240 C03B 88               DEY
2250 C03C B1FB             LDA (FREKZP),Y
2260 C03B C94B             CMP #'K
2270 C03D D0DD             BNE SKIPNUM
2280 C03F          ;
2290 C03F          ; THE CORRECT STRING HAS BEEN FOUND.
2300 C03F          ; NOW TEST TO SEE IF THERE IS ANYTHING
2310 C03F          ; IN IT TO SCAN FOR.
2320 C03F          ;
2330 C03F C8               INY
2340 C040 C8               INY
2350 C041 B1FB             LDA (FREKZP),Y
2360 C043 C900             CMP #$00
2370 C045 D005             BNE SCAN
2380 C047          ;
2390 C047          ; KEY$ DOES NOT HAVE ANY CHARACTERS
2400 C047          ; OR NO MORE VARIABLES WERE FOUND
2410 C047          ; SO PRODUCE NULL$ FOR EXIT.
2420 C047          ;
2430 C047 A900     NOVARS  LDA #$00
2440 C049 A8               TAY
2450 C04A F01F             BEQ EXIT
2460 C04C          ;
2470 C04C          ;
2480 C04C          ; KEY$ EXISTS AND DOES CONTAIN SOME
2490 C04C          ; CHARACTERS, SO SET UP SCAN INFORMATION
2500 C04C          ;
2510 C04C 85FD     SCAN    STA FREKZP+2
2520 C04E C8               INY
2530 C04F B1FB             LDA (FREKZP),Y
2540 C051 48               PHA
2550 C052 C8               INY
2560 C053 B1FB             LDA (FREKZP),Y
2570 C055 85FC             STA FREKZP+1
2580 C057 68               PLA
2590 C058 85FB             STA FREKZP
2600 C05A          ;
2610 C05A          ; NOW IT IS SIMPLY A CASE OF SCANNING
2620 C05A          ; THE KEYBOARD TO GET A KEY PRESS
2630 C05A          ; USING THE KERNAL ROUTINE GETIN
2640 C05A          ;
2650 C05A 20E4FF GETKEY    JSR GETIN
2660 C05D F0FB             BEQ GETKEY
2670 C05F          ;
2680 C05F          ; A KEY HAS BEEN PRESSED, SO CHECK FOR
2690 C05F          ; ITS LEGALITY.
2700 C05F          ;
2710 C05F A4FD             LDY FREKZP+2
2720 C061          ;
2730 C061 88       SCANLOOP   DEY
2740 C062 30F6             BMI GETKEY
2750 C064          ;
2760 C064          ; IF THE KEY WAS NOT LEGAL, IT WILL
2770 C064          ; BE IGNORED.
2780 C064          ;
2790 C064          ; CHECK IT IN THE STRING.
2800 C064          ;
2810 C064 D1FB             CMP (FREKZP),Y
2820 C066 D0F9             BNE SCANLOOP
2830 C068          ;
2840 C068          ; A VALID KEY WAS PRESSED, FOR WHICH
2850 C068          ; THE ASCII CODE IS NOW IN THE ACCUMULATOR.
2860 C068          ;
2870 C068          ; NOW MAKE A TIDY EXIT.
2880 C068          ;
2890 C068 A8               TAY
2900 C069 A900             LDA #$00
2910 C06B          ;
2920 C06B          ; RETURN VIA THE INTEGER-TO-F.P. ROUTINE
2930 C06B          ; WHICH CAN BE USED TO RETURN VALUES
2940 C06B          ; TO THE 'USR' FUNCTION.
2950 C06B          ;
2960 C06B 6C0500 EXIT      JMP ($0005)

002F ARYTAB     C008 CHECK      C06B EXIT       00FB FREKZP
FFE4 GETIN      C05A GETKEY     C02B NOTINT     C047 NOVARS
C014 OKVARS     C04C SCAN       C061 SCANLOOP   C01C SKIPNUM
002D VARTAB
```

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# COMMODORE SOFTWARE FILE

## UFO

*From Mark Manns for the unexpanded*

*Vic 20*

DESTROY THE rapidly mutating UFO to score points.

**Program notes**

5000-5080 Movement routine
5082 Detect hit
5093-5099 Give score
6000-6004 Move UFO
8003-8027 Information
10012-20002 Information
9000-9012 DATA for graphics

```
 30 SC=0
 60 CO=0 : FA=0
 70 LM$="■■■■■■■■■■■■■■■■■■■■■■■■"
 90 POKE36869,255
 100 GOSUB9000
 101 GOSUB8000
 102 GOSUB7000
 103 GOSUB5900
 104 GOSUB5000
 105 IFN=1THENFA=FA+1:GOSUB6001
 106 IFTI$=>"000200"THEN20000
 108 GOTO103
 5000 GETH$:IFH$<>"Z"ANDH$<>"C"ANDH$<>"M"THENRETURN
 5001 IFH$="Z"ANDCO>0THENCO=CO-1:GOTO5050
 5002 IFH$="C"ANDCO<16THENCO=CO+1:GOTO5050
 5003 IFH$="M"ANDGH<>5THEN5080
 5004 RETURN
 5050 PRINTLM$;TAB(CO)"■■  ■H■  ■■■■■■■■■■■■■■■■■■■
```

```
 6003 IFFA>15THENPRINT"■■■
```

# Connect 4

*From Les Allen on the Isle of Wight.*

CONNECT 4 for the Commodore 64 utilises high resolution graphics and sprites to produce an on-screen version of the popular board game of the same name. In order to make use of the full screen, each disc is made up of 4×3 characters and the graphics for the row numbers are re-arranged to be in the centre of each disc.

During play, the selected row for each disc is made by pressing keys 1 to 7. Pressing F1 resets a game, whereas F7 recalls the instruction page prior to the start of each new game.

A simple machine code routine is used during the title page sequence in order to reduce the time taken to screen print this.

### Variables

A used to read data
T general purpose
X disc position in x
Y disc position in y
CS screen position of disc
RP used to recall Connect 4
SU SUM of data in error trap routine
VC video chip start address
A$ "hme+crs dwn *25"
R$ "crs dwn + crs left*3"
X$ shape of disc
Y$ space
Z$ colour of disc

### Functional listing

14 Clear screen
16 screen and border black
18 generate A$ (used to simulate PRINT AT)
20 screen message during data transfer
22 clear sound chip
24 volume to maximum
26 set up waveform and note for voice 1
32 reserve memory
34 turn off keyscan interrupt timer
36 switch in character
38 read complete character set from ROM to RAM
40 switch in I/O
42 re-start keyscan interrupt timer
48 clear variables
50 define disc and graphics
58 define Connect 4 for title
66 set up machine code routine
72 error trap routine to check for correct data
74 set character pointer to 14336
80 clear screen: title page machine code routine
82- 92 text for title page
94 expand sprites in x and y
96-110 define shape, location and colour of sprite
112 switch in sprites
114 check for game re-start
116 varible T to O
118 peek keyboard
120 check for number of cycles or key pressed
122 checks for F1 or F7
124 stop 'till no key pressed
130 clear screen: colour black
132 clear keyboard buffer
134-140 define shape and colour of disc
142 set initial variables
144-146 print row number at bottom of screen
152 check for key pressed: switch off voice 1
154 switch off Connect 4
156 if F1 clear screen: print title: re-start game
158 if F7 recall instructions
160 if outside range return to 152
162 turn on voice 1
164 cal position of disc on screen
166 if no free space then return to 152
172 erase disc if printed
174 print in disc
176 calculate new position
178 delay loop
180 if new position space then change note and return to 172
182-184 change colour of disc
186 clear keyboard buffer: reset y: return to 152
192-258 character set data for graphics
264-360 sprite data for title page
366-416 machine code data

```
10 :
12 REM #### CLEAR SCREEN / SET INITIAL VARIABLES ####
14 PRINTCHR$(147)
16 VC=53248:POKEVC+32,0:POKEVC+33,0
18 A$="■■■
```

```
82 PRINTLEFT$(A$,12)SPC(4)CHR$(31)"DISCS MAY  BE CONNECTED TOGETHER"
84 PRINTLEFT$(A$,14)SPC(4)"EITHER HORIZONTALLY,  VERTICALLY"
86 PRINTLEFT$(A$,16)SPC(4)"OR OBLIQUELY TO PLACE 4 IN A ROW"
88 PRINTLEFT$(A$,19)SPC(4)"USE KEYS 1-7 TO SELECT YOUR ROW"
90 PRINTLEFT$(A$,21)SPC(6)"[F1].........RESETS A GAME"
92 PRINTLEFT$(A$,23)SPC(6)"[F7]....RECALLS INSTRUCTIONS"
94 POKEVC+23,255:POKEVC+29,255
96 POKE2040,200:POKEVC,60:POKEVC+1,73:POKEVC+39,1
98 POKE2041,201:POKEVC+2,90:POKEVC+3,73:POKEVC+40,3
100 POKE2042,202:POKEVC+4,120:POKEVC+5,73:POKEVC+41,4
102 POKE2043,202:POKEVC+6,150:POKEVC+7,73:POKEVC+42,5
104 POKE2044,203:POKEVC+8,180:POKEVC+9,73:POKEVC+43,7
106 POKE2045,200:POKEVC+10,210:POKEVC+11,73:POKEVC+44,10
108 POKE2046,204:POKEVC+12,240:POKEVC+13,73:POKEVC+45,13
110 POKE2047,205:POKEVC+14,40:POKEVC+15,73:POKEVC+16,128:POKEVC+46,14
112 SUM=0:FORT=0TO7:SUM=SUM+2↑T:POKEVC+21,SUM:FORTT=1TO100:NEXTTT,T
114 IFRP=1THEN124
116 T=0
118 P=PEEK(197)
120 IFT<>100ANDP=64THENT=T+1:GOTO118
122 IFP<30RP>4THENPOKEVC+21,0:FORT=1TO500:NEXT:GOTO112
124 IFPEEK(197)<>64THEN124
126 :
128 REM #### GAME START ####
130 PRINTCHR$(147):POKEVC+32,0:POKEVC+33,0
132 POKE198,0
134 R$=CHR$(17)+CHR$(157)+CHR$(157)+CHR$(157)+CHR$(157)+CHR$(157)
136 X$=CHR$(18)+"@ABC"+R$+"DEEF"+R$+"GHIJ"
138 Y$="  "+R$+"    "+R$+"    "
140 Z$=CHR$(150)
142 Y=1:CS=0:RP=0
144 PRINTLEFT$(A$,25)SPC(1)CHR$(18)CHR$(5)"KL"SPC(4)CHR$(150)"MN"SPC(4)CHR$(159)
"OP";
146 PRINTSPC(4)CHR$(156)"QR"SPC(4)CHR$(30)"ST"SPC(4)CHR$(154)"UV"SPC(4)CHR$(158)
"WX";
148 :
150 REM #### KEYBOARD ####
152 GETKEY$:IFKEY$=""THENPOKE54276,32:GOTO152
154 POKEVC+21,0
156 IFKEY$=CHR$(133)ANDCS<>0THENPRINTCHR$(147):RP=1:GOTO112
158 IFKEY$=CHR$(136)THEN80
160 IFKEY$<"1"ORKEY$>"7"THEN152
162 POKE54276,33
164 X=(VAL(KEY$)-1)*6:CS=1106+X
166 IFPEEK(CS)<>32THEN152
168 :
170 REM #### DROP DISC ####
172 IFY>1THENPRINTLEFT$(A$,Y-1)SPC(X)Y$
174 PRINTLEFT$(A$,Y)SPC(X)Z$X$
176 Y=Y+1:CS=CS+40
178 FORT=1TO25:NEXT
180 IFPEEK(CS+40)=32THENPOKE54272,147-Y*6:GOTO172
182 IFZ$=CHR$(150)THENZ$=CHR$(30):GOTO186
184 Z$=CHR$(150)
186 POKE198,0:Y=1:GOTO152
188 :
190 REM #### CHARACTER SET DATA ####
192 DATA0,0,1,3,15,31,63,127
194 DATA1,63,255,255,255,255,255,255
196 DATA128,252,255,255,255,255,255,255
198 DATA0,0,128,192,240,248,252,254
200 DATA127,255,255,255,255,255,255,127
202 DATA255,255,255,255,255,255,255,255
204 DATA254,255,255,255,255,255,255,254
206 DATA127,63,31,15,3,1,0,0
208 DATA255,255,255,255,255,255,63,1
210 DATA255,255,255,255,255,255,252,128
212 DATA254,252,248,240,192,128,0,0
214 DATA254,254,252,254,254,254,248,255
216 DATA127,127,127,127,127,127,31,255
218 DATA252,249,255,255,252,243,248,255
220 DATA63,159,159,63,255,255,31,255
222 DATA252,249,255,254,255,249,252,255
224 DATA63,159,159,63,159,159,63,255
226 DATA255,255,254,249,248,255,255,255
228 DATA159,31,31,159,31,159,159,255
230 DATA248,249,248,255,255,249,252,255
232 DATA31,255,63,159,159,159,63,255
234 DATA252,249,249,248,249,249,253,255
236 DATA63,159,255,63,159,159,63,255
238 DATA248,249,255,254,254,254,254,255
240 DATA31,159,63,127,127,127,127,255
242 DATA255,128,128,128,143,136,136,136
244 DATA136,136,136,143,128,128,128,255
246 DATA255,1,1,1,241,17,17,17
248 DATA17,17,17,241,1,1,1,255
250 DATA136,136,136,136,136,136,136,136
```

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```
252 DATA17,17,17,17,17,17,17,17
254 DATA255,0,0,0,255,0,0,0
256 DATA0,0,0,255,0,0,0,255
258 DATA-1
260 :
262 REM #### SPRITE DATA ####
264 DATA60,0,0,60,0,0,60,0
266 DATA0,102,0,0,102,0,0,102
268 DATA0,0,96,0,0,96,0,0
270 DATA96,0,0,96,0,0,96,0
272 DATA0,96,0,0,96,0,0,96
274 DATA0,0,96,0,0,102,0,0
276 DATA102,0,0,102,0,0,60,0
278 DATA0,60,0,0,60,0,0,0
280 DATA60,0,0,60,0,0,60,0
282 DATA0,102,0,0,102,0,0,102
284 DATA0,0,102,0,0,102,0,0
286 DATA102,0,0,102,0,0,102,0
288 DATA0,102,0,0,102,0,0,102
290 DATA0,0,102,0,0,102,0,0
292 DATA102,0,0,102,0,0,60,0
294 DATA0,60,0,0,60,0,0,0
296 DATA102,0,0,102,0,0,102,0
298 DATA0,102,0,0,102,0,0,102
300 DATA0,0,118,0,0,118,0,0
302 DATA118,0,0,126,0,0,126,0
304 DATA0,126,0,0,110,0,0,110
306 DATA0,0,110,0,0,102,0,0
308 DATA102,0,0,102,0,0,102,0
310 DATA0,102,0,0,102,0,0,0
312 DATA126,0,0,126,0,0,126,0
314 DATA0,96,0,0,96,0,0,96
316 DATA0,0,96,0,0,96,0,0
318 DATA96,0,0,120,0,0,120,0
320 DATA0,120,0,0,96,0,0,96
322 DATA0,0,96,0,0,96,0,0
324 DATA96,0,0,96,0,0,126,0
326 DATA0,126,0,0,126,0,0,0
328 DATA126,0,0,126,0,0,126,0
330 DATA0,24,0,0,24,0,0,24
332 DATA0,0,24,0,0,24,0,0
334 DATA24,0,0,24,0,0,24,0
336 DATA0,24,0,0,24,0,0,24
338 DATA0,0,24,0,0,24,0,0
340 DATA24,0,0,24,0,0,24,0
342 DATA0,24,0,0,24,0,0,0
344 DATA6,0,0,6,0,0,6,0
346 DATA0,14,0,0,14,0,0,14
348 DATA0,0,30,0,0,30,0,0
350 DATA30,0,0,102,0,0,102,0
352 DATA0,102,0,0,127,0,0,127
354 DATA0,0,127,0,0,6,0,0
356 DATA6,0,0,6,0,0,6,0
358 DATA0,6,0,0,6,0,0,0
360 DATA-1
362 :
364 REM #### MACHINE CODE DATA ####
366 DATA162,38,169,6,157,0,216,157
368 DATA192,219,169,159,157,0,4,169
370 DATA160,157,192,7,202,240,3,76
372 DATA2,192,162,240,169,6,157,0
374 DATA216,157,240,216,157,224,217
376 DATA157,168,218,157,39,216,157,23
378 DATA217,157,7,218,157,207,218,169
380 DATA157,157,0,4,157,240,4,157
382 DATA224,5,157,168,6,169,158,157
384 DATA39,4,157,23,5,157,7,6
386 DATA157,207,6,160,40,202,142,132
388 DATA3,136,208,249,174,132,3,240
390 DATA3,76,28,192,169,6,141,0
392 DATA216,141,39,216,141,192,219,141
394 DATA231,219,169,153,141,0,4,169
396 DATA154,141,192,7,169,155,141,39
398 DATA4,169,156,141,231,7,162,36
400 DATA169,133,157,81,4,157,121,4
402 DATA157,161,4,157,201,4,157,241
404 DATA4,157,25,5,157,65,5,169
406 DATA6,157,81,216,157,121,216,157
408 DATA161,216,157,201,216,157,241,216
410 DATA157,25,217,157,65,217,202,240
412 DATA3,76,135,192,169,3,141,32
414 DATA208,141,33,208,96
416 DATA-1
418 :
420 :
422 REM ########################
424 REM ########################
426 REM ####                ####
428 REM ####   CONNECT 4    ####
430 REM ####                ####
432 REM #### COMMODORE  64 ####
434 REM ####                ####
436 REM ####   LES ALLAN    ####
438 REM ####                ####
440 REM #### 7TH  NOVEMBER ####
442 REM ####                ####
444 REM ####      1983      ####
446 REM ####                ####
448 REM ########################
450 REM ########################
```

| Address Decml | Address Hex | Machine Code | | | Assembly Code Program | |
|---|---|---|---|---|---|---|
| 49152 | C000 | A2 | 26 | | LDXIM | 38 |
| 49154 | C002 | A9 | 06 | | LDAIM | 6 |
| 49156 | C004 | 9D | 00 | D8 | STAX | 55296 |
| 49159 | C007 | 9D | C0 | DB | STAX | 56256 |
| 49162 | C00A | A9 | 9F | | LDAIM | 159 |
| 49164 | C00C | 9D | 00 | 04 | STAX | 1024 |
| 49167 | C00F | A9 | A0 | | LDAIM | 160 |
| 49169 | C011 | 9D | C0 | 07 | STAX | 1984 |
| 49172 | C014 | CA | | | DEX | |
| 49173 | C015 | F0 | 03 | | BEQ | 3 |
| 49175 | C017 | 4C | 02 | C0 | JMP | 49154 |
| 49178 | C01A | A2 | F0 | | LDXIM | 240 |
| 49180 | C01C | A9 | 06 | | LDAIM | 6 |
| 49182 | C01E | 9D | 00 | D8 | STAX | 55296 |
| 49185 | C021 | 9D | F0 | D8 | STAX | 55536 |

| Address Decml | Hex | Machine Code | | | Assembly Code Program | |
|---|---|---|---|---|---|---|
| 49188 | C024 | 9D | E0 | D9 | STAX | 55776 |
| 49191 | C027 | 9D | A8 | DA | STAX | 55976 |
| 49194 | C02A | 9D | 27 | D8 | STAX | 55335 |
| 49197 | C02D | 9D | 17 | D9 | STAX | 55575 |
| 49200 | C030 | 9D | 07 | DA | STAX | 55815 |
| 49203 | C033 | 9D | CF | DA | STAX | 56015 |
| 49206 | C036 | A9 | 9D | | LDAIM | 157 |
| 49208 | C038 | 9D | 00 | 04 | STAX | 1024 |
| 49211 | C03B | 9D | F0 | 04 | STAX | 1264 |
| 49214 | C03E | 9D | E0 | 05 | STAX | 1504 |
| 49217 | C041 | 9D | A8 | 06 | STAX | 1704 |
| 49220 | C044 | A9 | 9E | | LDAIM | 158 |
| 49222 | C046 | 9D | 27 | 04 | STAX | 1063 |
| 49225 | C049 | 9D | 17 | 05 | STAX | 1303 |
| 49228 | C04C | 9D | 07 | 06 | STAX | 1543 |
| 49231 | C04F | 9D | CF | 06 | STAX | 1743 |
| 49234 | C052 | A0 | 28 | | LDYIM | 40 |
| 49236 | C054 | CA | | | DEX | |
| 49237 | C055 | 8E | 84 | 03 | STX | 900 |
| 49240 | C058 | 88 | | | DEY | |
| 49241 | C059 | D0 | F9 | | BNE | 249 |
| 49243 | C05B | AE | 84 | 03 | LDX | 900 |
| 49246 | C05E | F0 | 03 | | BEQ | 3 |
| 49248 | C060 | 4C | 1C | C0 | JMP | 49180 |
| 49251 | C063 | A9 | 06 | | LDAIM | 6 |
| 49253 | C065 | 8D | 00 | D8 | STA | 55296 |
| 49256 | C068 | 8D | 27 | D8 | STA | 55335 |
| 49259 | C06B | 8D | C0 | DB | STA | 56256 |
| 49262 | C06E | 8D | E7 | DB | STA | 56295 |
| 49265 | C071 | A9 | 99 | | LDAIM | 153 |
| 49267 | C073 | 8D | 00 | 04 | STA | 1024 |
| 49270 | C076 | A9 | 9A | | LDAIM | 154 |
| 49272 | C078 | 8D | C0 | 07 | STA | 1984 |
| 49275 | C07B | A9 | 9B | | LDAIM | 155 |
| 49277 | C07D | 8D | 27 | 04 | STA | 1063 |
| 49280 | C080 | A9 | 9C | | LDAIM | 156 |
| 49282 | C082 | 8D | E7 | 07 | STA | 2023 |
| 49285 | C085 | A2 | 24 | | LDXIM | 36 |
| 49287 | C087 | A9 | 85 | | LDAIM | 133 |
| 49289 | C089 | 9D | 51 | 04 | STAX | 1105 |
| 49292 | C08C | 9D | 79 | 04 | STAX | 1145 |
| 49295 | C08F | 9D | A1 | 04 | STAX | 1185 |
| 49298 | C092 | 9D | C9 | 04 | STAX | 1225 |
| 49301 | C095 | 9D | F1 | 04 | STAX | 1265 |
| 49304 | C098 | 9D | 19 | 05 | STAX | 1305 |
| 49307 | C09B | 9D | 41 | 05 | STAX | 1345 |
| 49310 | C09E | A9 | 06 | | LDAIM | 6 |
| 49312 | C0A0 | 9D | 51 | D8 | STAX | 55377 |
| 49315 | C0A3 | 9D | 79 | D8 | STAX | 55417 |
| 49318 | C0A6 | 9D | A1 | D8 | STAX | 55457 |
| 49321 | C0A9 | 9D | C9 | D8 | STAX | 55497 |
| 49324 | C0AC | 9D | F1 | D8 | STAX | 55537 |
| 49327 | C0AF | 9D | 19 | D9 | STAX | 55577 |
| 49330 | C0B2 | 9D | 41 | D9 | STAX | 55617 |
| 49333 | C0B5 | CA | | | DEX | |
| 49334 | C0B6 | F0 | 03 | | BEQ | 3 |
| 49336 | C0B8 | 4C | 87 | C0 | JMP | 49287 |
| 49339 | C0BB | A9 | 03 | | LDAIM | 3 |
| 49341 | C0BD | 8D | 20 | D0 | STA | 53280 |
| 49344 | C0C0 | 8D | 21 | D0 | STA | 53281 |
| 49347 | C0C3 | 60 | | | RTS | |

# Blockbuster

*From Paul Hope at the Staffordshire software house Micro-Antics.*

A USEFUL little Vic utility: Blockbuster is a character generator using multi-colour mode.

Unlike most generators it works on a 2×3 block of characters allowing the build-up of multi character images. The characters are built on a large scale image of 16×24 blocks with full cursor control. Keys A, S, B and C enter the Auxilliary, Screen, Background and Character colours respectively and E to exit.

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# MR CHIP SOFTWARE

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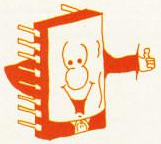

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## COMMODORE 64

### KONG

KB / JS

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1. CHASING FIREBALLS AND BARRELS. CAN BE SMASHED BY THE MALLET IF YOU CAN JUMP UP AND GET IT

2. JUMP OVER THE PIES AS YOU RUN ALONG THE CONVEYOR BELT. MAKE SURE YOU DONT END UP INSIDE THE COOKER.

3. THE ONLY WAY UP IS BY THE LIFT WHICH IS UNDER A CONSTANT BARRAGE OF GIRDERS.

4. KNOCK OUT ALL THE SUPPORTS BY RUNNING OVER THEM AND WITNESS THE SPECTACULAR COLLAPSE OF KONGS LAIR.

### SKRAMBLE

J.S.

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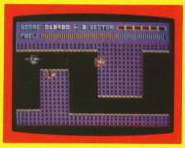
1. RAMMING MISSILES HURTLE TOWARDS YOU.

2. FIGHT COBRON QUASER ION SHIPS.

3. DODGE THE FIREBALLS, BECAUSE YOU CAN'T SHOOT THEM DOWN.

4. CITY WITH HIGH RISE BUILDINGS.



5. GUIDE YOUR SHIP WITH DEXTERITY THROUGH THE MAZE.

6. DESTROY THE BASE BEFORE YOU RUN OUT OF FUEL.

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### FROG RUN

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K.B. / J.S. £5.95

```
1 REM "BLOCKBUSTER", A LITTLE THING FOR
PLAYING WITH MULTI-COLOUR GRAPHICS.
2 REM
3 REM BY MICRO-ANTICS
4 REM
5 REM DON'T TYPE IN REM STATEMENTS
6 REM COL() IS THE 4 COLOURS, H$ IS FOR
HEX VALUES
10 DIMCOL(3):H$="0123456789ABCDEF"
20 INPUT"□CONT OR DATA (C/D)";A$:IFA$="D
"GOTO290
30 PRINT"□":INPUT"SCREEN COL";COL(0)
40 INPUT"CHARAC COL";COL(2) : IFCOL(2)>7
THENPRINT"STD COLOUR CODE ONLY":GOTO40
50 INPUT"BORDER COL";COL(1)
60 INPUT"AUXILY COL";COL(3)
61 REM SET SCREEN AND BORDER
70 POKE36879,COL(0)*2↑4+COL(1)+8:    POKE
36878,COL(3)*2↑4
71 REM INC NO OF ROWS, DEC COLS, PROTECT
 MEM, MOVE CHAR SET, LEN OF KBD BUFF=1.
80 PRINT"□":POKE36867,48:POKE36866,149:
POKE36869,255:POKE52,28: POKE56,28 :POKE
649,1
81 REM CREATE BLOCK CHAR AND BLANK.
90 FORI=0TO7:POKE7176+I,255:POKE7424+I,0
:NEXT
97 REM LOOP TO PUT CHAR DATA ON SCREEN.
98 REM X IS CURSOR LINE, Y IS ROW, T1 IS
 CURSOR POS, CHAR1 IS BLOCK.
99 REM SUB3000 CALCULATES CHAR BYTE (T)
AND BIT (T2)
100 X=0:Y=0:FORI=0TO192:T1=7680+X*21+Y:
POKET1,1:POKET1+1,1:GOSUB3000
109 REM CO IS COLOUR TYPE OF BIT PAIR.
110 CO=(PEEK(T)AND3*2↑T2)/2↑T2:POKET1+30
720,COL(CO):POKET1+30721,COL(CO):GOSUB10
00:NEXTI
119 REM LOOP TO DISPLAY HI RES CHARS.
120 FORY=0TO1:FORX=0TO2:T=7722+18+Y+X*21
:POKET,2+3*Y+X:POKET+30720,COL(2)+8:NEXT
X,Y
129 REM START INPUT.
130 X=0:Y=0
139 REM T=CSR POSN, T2=COL POS OF T, TC=
COL AT CSR.
140 T=7680+X*21+Y:T2=T+30720:TC=PEEK(T2)
149 REM TIME TO CHANGE CSR COLOUR?
150 IFSEC=INT(TI/20)GOTO170
159 REM RESET CSR TIMER & CHANGE CSR COL
160 SEC=INT(TI/20):POKET2,NOTPEEK(T2)AND
7
169 REM D=VAL OF KEY PRESSED + SHIFT KEY
 FACTOR. 64 IS NO KEY.
170 D=PEEK(197)+PEEK(653)*100:IFD=64GOTO
150
179 REM KEY PRESSED, RESTORE COL UNDER C
SR.
180 POKET,1:POKET2,TC
189 REM CALC GOTO NUMBER FOR KEY SELECTD
190 CO=-(8*(D=123)+7*(D=23)+6*(D=131)+5*
(D=31)+4*(D=17)+3*(D=34)+2*(D=35)+(D=41)
```

```
)
200 ONCOGOTO250,250,250,250,240,260,230,
270
210 IFD<>49GOTO150
219 REM "E" KEY, NORMALISE SCRN AND RETN
 TO START.
220 POKE36869,240:POKE36866,150:POKE3686
7,46:POKE36879,27:POKE631,0:GOTO20
229 REM CSR RIGHT
230 GOSUB1000:GOTO140
239 REM CRS DOWN
240 X=X+1:X=X*(1+(X>23)):GOTO140
249 REM PUT NEW COL IN AND GOSUB2000 TO
PUT IT IN HI RES CHAR.
250 POKET2,COL(CO-1):POKET2+1,COL(CO-1):
GOSUB2000:GOTO140
259 REM CSR UP
260 X=X-1:X=X-24*(X<0):GOTO140
269 REM CSR LEFT
270 Y=Y-2:Y=Y-16*(Y<0):IFY=14GOTO260
279 REM GO BACK FOR MORE.
280 GOTO140
289 REM ROUTINE TO PRINT OUT DATA
290 PRINT"□CHARACTER DATA":D=0
300 PRINT"■■■CHARACTER NO"D"■■"
310 FORCO=0TO7:T=PEEK(7184+D*8+CO):PRINT
T,"$"MID$(H$,INT(T/16)+1,1);
319 REM LAST HEX CHAR, NB SPACE AFTER T.
320 PRINTMID$(H$,(T AND15)+1,1):NEXTCO
330 INPUT"■■NEXT (Y/N)";A$:IFA$="Y"THEND
=(D+1)*-(D<>5):GOTO300
340 GOTO20
999 SUB1000 INCS X AND Y.
1000 Y=Y+2:X=X+(1+(Y<15)):Y=Y*(1+(Y>15))
:X=X*(1+(X>23)):RETURN
2000 GOSUB3000
2010 POKET,(PEEK(T)AND(255-3*2↑T2))+(CO-
1)*2↑T2:GOSUB1000:RETURN
2999 REM T IS HI RES CHAR BYTE, T2 IS BI
T POSN.
3000 T=7184+24*(1+(Y<8))+X:T2=6-(Y-8*(1+
(Y<8))):RETURN
4000 TO USE
4001 REM SELECT DATA OR CONTINUE
4002 UNDER CONT, ENTER THE FOUR COLOURS
4003 THEN CURRENT CONTENTS OF THE SIX CH
ARACTERS WILL BE DISPLAYED.
4004 THEN USE THE FOLLOWING KEYS TO CREA
TE YOUR CHARACTERS
4005 "E" TO EXIT, "C" FOR CHAR COL, "A"
FOR AUX COL, "B" FOR BORDER COL
4006 "S" FOR SCREEN COL. EACH COL TAKES
TWO PIXELS IN MULTI-COL MODE.
4007 MOVE AROUND THE SCREEN USING STANDA
RD CURSOR KEYS.
```

# Astro Wars

*From David Jones for the unexpanded Vic.*

THE PROGRAM notes for Astro Wars are: line 110 sets up the variables. Line 120 clears the screen and turns on the sound. Lines 130 to 170 set up the user defined graphics, Lines 180 to 200 put you and the aliens on the screen. Lines 210 to 340 move the aliens and do various checks. Lines 350 to 430 move you and do more checks. Lines 440-550 are the hit routine and check to see if you have any men left.

This program is for the unexpanded Vic 20 and uses a joystick but can easily be changed to the use of keys (lines 350-400). Also the last alien has to be destroyed several times.

```
100 REM**ASTRO WARS BY DAVID JONES**
110 D(1)=22:D(2)=-22:D(3)=1:D(4)=-1:TI$="000000":W=128
120 PRINT"■":POKE36869,255:POKE36878,15:DIMAL(5)
130 FORI=7168TO7199:READA:POKEI,A:NEXT
140 DATA24,24,24,255,255,255,255,255
150 DATA126,129,165,129,126,24,36,195
160 DATA0,0,0,0,0,0,0,0
170 DATA16,16,16,16,16,16,16,16
180 FORI=1TO5:POKE7724+(I*5),1:POKE38444+(I*5),0:AL(I)=7724+(I*5):NEXT
190 X=8164
200 POKEX+Y,0:POKE30720+X+Y,0
210 FORI=1TO5
220 M=INT(RND(1)*4)+1
230 IFS>3 THEND(2)=22
240 IFAL(I)=64000 THENNEXT
250 IFI>5 THEN350
260 IFAL(I)+D(M)>7834 THENM=2
270 IFAL(I)+D(M)<7680 THENM=1
280 IFAL(I)+D(M)>8185THENPOKE36869,240:PRINT"■YOU WERE DESTROYED,DO YOU WANT ANO
THER GO"
290 IFAL(I)+D(M)>8185 THENGETB$:IFB$="" THEN290
300 IFB$="Y" THENRUN
310 IFB$="N" THENEND
320 POKE36877,230:POKEAL(I),2:POKEAL(I)+D(M),1:POKEAL(I)+D(M)+30720,0:AL(I)=AL(I
)+D(M)
330 POKE36877,0
340 NEXT
350 POKE37151,0:PA=37151:PB=37152:RB=37154
360 A=PEEK(PA):POKERB,127:B=PEEK(PB):POKERB,255
370 IF(BAND128)=0 THENY=Y+1:POKEX+Y-1,2:IFX+Y>8185 THENY=Y-1
380 IF(AAND16)=0 THENY=Y-1:POKEX+Y+1,2:IFX+Y<8164 THENY=Y+1
390 IF(AAND32)=0 THENFORF=0TO506 STEP22
400 IF(AAND32)=0 THENPOKE36877,248:POKEX+Y-22-F,3:POKEX+Y-22-F+30720,2:POKEX+Y-2
2-F,2
410 IFPEEK(X+Y-44-F)=1 THENPOKEX+Y-44-F,4:POKEX+Y-44-F,2:S=S+1:GOSUB440:GOTO200
420 IF(AAND32)=0 THENNEXT
430 POKE36877,0:GOTO200
440 EX=EX+1
450 IFEX=8 THEN500
460 IFEX=5 THENRETURN
470 FORI=1TO5:IFPEEK(AL(I))=2 THENAL(I)=64000
480 NEXT
490 RETURN
500 POKE36878,0
510 POKE36869,240:PRINT"■YOU HAVE DESTROYED THEALIENS IN ";TT$:PRINT"MINUTES"
520 PRINT"DO YOU WANT ANOTHER GO(Y/N)"
530 GETA$:IFA$="" THEN530
540 IFA$="Y" THENRUN
550 END
```

# Singing Roller Canary

*From Richard Barton in Dagenham, Essex.*
THIS PROGRAM was written for the unexpanded Vic 20 and though quite brief, it gives an accurate impersonation of a Roller Canary singing.

```
3 REM ROLLER CANARY
4 REM R.BARTON,1983
5 POKE36878,6
7 C=INT(RND(1)*10)
8 Q=INT(RND(1)*10)+1
11 IFC<5THENGOSUB60
12 FORR=1TO8
20 FORP=190TO254STEPQ
30 POKE36876,P
40 NEXTP
45 NEXTR
50 GOTO7
60 RP=INT(RND(1)*10)+1
70 FORR=1TORP
80 FORP=254TO190STEP-Q
90 POKE36876,P
100 NEXTP
110 NEXTR
120 RETURN
```

**Send us your Commodore programs, enclosing a cassette — and a printout on plain white paper if possible. Each listing must be accompanied by a typewritten introduction describing the program and explaining how it is constructed. We pay £6.00 for each bug-free listing published. We cannot guarantee to return every program submitted, so please keep a copy. If you want us to return your listing you must include a stamped, addressed envelope. If you have any problems with the programs, please write to the appropriate author, Software File, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD**

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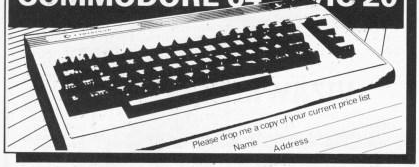




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# ANSWER BACK

## Cassette complaint

I HAVE recently purchased a Commodore 64 and am really enjoying learning how to use it. I have just discovered though that, unlike many cheaper computers, there is no way to connecting it to my tape recorder.

Unless I buy a special cassette unit I will have to re-program it every time I switch on. As I have just paid out for the 64 I cannot afford another £40 for a cassette unit.

I wonder if you could suggest any way around this problem. I am extremely disappointed at being unable to begin making up programs and playing some games.

Perhaps someone reading this may have an idea, or may have a second hand cassette unit they wish to sell — or even just the part of the connecting wire which plugs into the control port of the Commodore 64.

*Miss Linda J McColl*
*18 Titwood Road*
*Glasgow*

**WE SYMPATHISE with your plight. Too many shops are more than eager to sell you the computer without bothering to tell you about the Commodore cassette recorder. They know that sooner or later you will have to come back with more cash.**

**For some reason Commodore has always, on its home computers, kept the cassette recorder separate. Some of the decoding circuitry which is normally in a home computer is housed inside the Commodore cassette recorder.**

**The disadvantage of this is that you have to spend more money. The advantage, however, is that your programs will load and save correctly almost every time. This is certainly not the case with most of the other home computers.**

**You can also control the motor on the Commodore cassette player from the computer. This has many strong advantages with many more complex programs involving a lot of data.**

**Unfortunately you will be able to do very little with your computer until you buy the cassette recorder. It is probably time to a) start saving and b) look out for a second hand version (or maybe one of our readers can help here).**

## Better book buys

ARE YOU able to recommend a really good introduction to machine code programming for the 64?

*T Passmore*
*Ivybridge*
*South Devon*

**THE BEST introduction is Dr Watson's *CBM 64 Beginner's Assembly Language* which is now available from the bigger computer stores, including places like Smiths. Once you've mastered this try moving on to *Advanced Basic and Machine code for the 64*, which is written by Pete Gerrard and published by Duckworth.**

## Routine revisited

THE POKE routine in Answer Back (December/January issue) to enable 3.5K programs to be run with expansion to the Vic does not seem to work.

The Autumn 1983 VicSoft catalogue gives another routine designed to achieve the same end. However, it does not seem to work either. It says: List the program. Remove any POKE's 52, 53, 55 or 56. Re-save the new version if required. Before loading the program (presumably for the second time) type in the following:

```
10 POKE642,32:REM
CHANGE START OF
BASIC
20 POKE36869,240:POKE
36866,150:REM
REORGANISE SCREEN
30 POKE0,108:POKE1,0:
POKE2,192:SYS0:REM
RESTART BASIC
```

However, simply "typing" in the above will achieve nothing, as it will be NEWed on loading the main program. Running the above routine before loading the main program gives a screen full of rubbish, and loss of keyboard control, POKEing in direct mode has the same effect. Perhaps you can advise further.

*J M Dunnet*
*Prestatyn*
*Clwyd*

**THIS TIME we'll get it right, courtesy of Mike Todd and ICPUG. Writing in the July 1982 issue of the group's newsletter, Mike recommended the following POKE/SYS sequence to downgrade the Vic, in direct mode:**

**POKE 641,0: POKE 642,X: POKE 643,0: POKE 644,Y: POKE 648,Z: SYS 64824**

**X, Y and Z can be obtained from this table:**

| *Memory* | *X* | *Y* | *Z* |
|---|---|---|---|
| Unexpanded | 16 | 30 | 30 |
| +3K | 4 | 30 | 30 |
| +8K | 18 | 64 | 16 |
| +16K | 18 | 96 | 16 |
| +24K | 18 | 128 | 16 |

## Expanding memory

I HAVE at present an unexpanded Vic 20 computer from which I have received hours of enjoyment. I now wish to expand its memory. Before I do I would appreciate your help by answering this question.

If I purchase a 16K RAM pack will I be able to play any cassette program up to a maximum of 16K (not including unexpanded ones of course) or do I have to purchase a 3K, 8K and 16K memory pack separately to enable me to play each particular cassette with that particular size of memory?

*A C Terry*
*Norwich*
*Norfolk*

**MOST GOOD software is now written so that on loading it will check and re-set pointers to make the main program run in any memory configuration — so long as the program is no larger than the total memory available.**

**To run other software I would advise buying a switchable 16K RAM pack giving you the option of 3K, 8K and 16K expansion. One company I know which provides such an expansion pack is Downsway Electronics, Depot Rd, Epsom, Surrey.**

## Saving a program

I BOUGHT the first edition of your magazine and I think it's great.

I do have one query, though, about the CBM 64. I'd like to know what figures you print in if you are writing a program and you want to save it to tape.

*Michael Jones*
*Davenport*
*Stockport*
*Cheshire*

**IT'S NOT clear from your question whether you're asking about saving a program or data to tape. Just in case, here's the answer for both.**

**To save a program to tape use:**
**SAVE "PROGRAM"**
**and to save data to tape use:**
**OPEN 1,1,1, "NAME OF PROGRAM"**
**For more information try pages 65-67 and 81-82 of the *Commodore 64 Programmer's Reference Guide*.**

## Consult Commodore

I AM the owner of a Commodore 64 computer. However, I accidentally broke a key on the keyboard. The broken key has come from the top left-hand corner of the computer, next to the number 1 key and just above the CTRL key. It prints arrows to point left.

What I want to know is who would be able to sell me a new key.

*James Stephenson*
*Simonside*
*South Shields*
*Tyne and Wear*

**THE BEST place to contact is Commodore itself. Either telephone Slough 71133 or write to Commodore Services, 675 Ajax Avenue, Trading Estate, Slough, Berks.**

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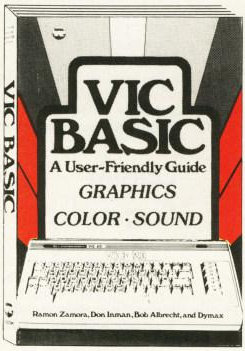


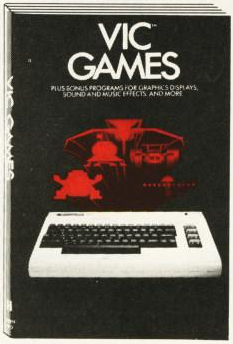


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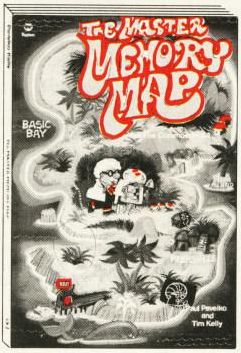


## The Master Memory Map for the Commodore 64

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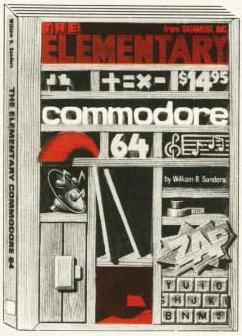


## The Elementary Commodore 64

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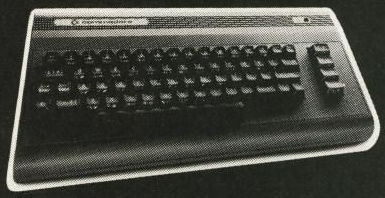

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*Tony Roberts tests your skill*

FEELINGS have been running high at the Hell Nook Micro Club ever since last month's fiasco with the disconnected micros.

It's got so bad now that Algernon won't talk to Bertie, Cornelius refuses to let anyone see his new machine, and Desdemona has taken to communicating only in code. She's even labelled her locker "CODE ROOM 'M' ".

All this is driving poor Esmerelda to distraction — but then she discovers Desdemona's code program listing and realises that the name on the locker is in fact in code itself. All she needs is the missing DATA line at 120 to crack the code.

It's not too difficult to find the solution — a well-known name — and so Esmerelda sends a coded message back to Dedemona: "TAO! ETMKL"! What should the DATA line contain?

As a tie-breaker, complete the following sentence in less than 15 words: "I want to own a printer/plotter because . . ."

**Send your answers to Competition Corner, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD — to arrive no later than the last working day in the month on the cover of this issue. The name of the winner, and the solution to the puzzle, will be published in the issue after next. Entries will not be acknowledged and we cannot enter into correspondence on the result**

```
10 LET A$="CODEROOMM"
20 LET A=0
21 LET X=0
22 LET Y=0
30 PRINT "AFTER ";A;" GOES, X,Y EQUALLED ";X;",";Y;" AND A$ HELD ";A$
40 IF A=5 THEN STOP
50 LET A=A+1
60 READ X,Y
65 LET V$=MID$(A$,1,X-1)
70 LET X$=MID$(A$,X,Y)
80 LET Y$=MID$(A$,X+Y,Y)
90 LET Z$=MID$(A$,X+(2*Y),LEN(A$)-X-(S*Y))
100 LET A$=V$+Y$+X$+Z$
110 GOTO 30
120 DATA
Ready.
```

MARKET VIEW

# Barking back at the news

PIN-STRIPED chairman of British companies normally take press criticism silently. Not so Irving Gould, chairman of Commodore, who was anything but tight-lipped when Commodore's shares fell by $8 to $32 in just two days after hostile reports.

The issues at stake were the levels of returns — how many models are sent back to the factory because they're defective — and shortages of peripherals such as disk drives, printers and monitors.

A US TV business programme put the Commodore 64 return rate at over 50%. "This is absolutely false and totally irresponsible reporting by that network's commentator," retorted the chairman.

That was mild, though, compared to the treatment reserved for the *Wall Street Journal's* young reporter Dennis Kneale who put the returns rate at 20% to 30% and listed dealers who were moaning about stock shortages.

First Irving Gould said: "We hope that Mr Kneale's editors and all *Wall Street Journal* readers of Mr Kneale's story remember his name as to the credibility of his leading readers correctly, or totally misleading readers as to the prospects of Commodore."

Then we had "just because a 26-year-old reporter says it's so doesn't make it true" And, for good measure, the chairman added that he was suing one of the reporter's sources over a $1 million bad debt, while another was an ex-Commodore employee who had been demoted from financial vice president to credit manager.

Heady stuff, however much of it is true (Commodore of course says the return rate is 7% and the moans are from "small, somewhat unhappy dealers whose credit ratings in many instances could not allow us to ship them more product".

Still, if Commodore is having problems, it is not alone in the home computer market. The shake-out in the industry is claiming victims big and small, notably Texas Instruments which has pulled out of micros. Some survivors are still struggling, while two newcomers with models posing a particular threat to Commodore's 64 have had uninspiring debuts.

Coleco's $600 Adam — hailed as the small computer to end all others including IBM's PC — arrived late, prompting law suits alleging false claims by Coleco and the cancellation of $4 million worth of advertising.

Now it's here, the software and the manuals have been criticised; hundreds are being returned with problems covering the Basic cartridges, tape drives and printers; and a target of 500,000 shipments by the year end had to be revised to 130,000. Luckily, there have been the Cabbage Patch Kid dolls to give Coleco a happy Christmas.

Meanwhile, mighty IBM may for once have misjudged the market with its Peanut. The PC Jr — as it's officially and awkwardly known — is, according to the US magazine *Fortune*, "an ordinary chap technologically, bringing little more to the party than a famous family name".

The basic model, selling at $669, has no more than 64K of memory (the same as the Commodore but look at the price), no disk drive (and the cable connecting Junior to an old-fashioned tape recorder costs £20), and a much-vaunted detachable infra-red keyboard of little use if your program has a mass of figures and you've got weak eyes.

What's more, IBM has missed the vital Christmas selling period and the Junior won't be in the UK much before next Christmas.

Where does this leave Commodore in 1984? The market may well look different to 1983. Commodore's UK marketing manager John Baxter expects growth in sales (more than doubled in 1983 from 720,000 to 1.6 million) to ease off to give sales of some 2.2 million in 1984.

The price-cutting wars could well be over too. No doubt with an eye to the price of the PC Jr, loss-laden Atari and Coleco raised prices on January 1 by up to 25%.

Commodore won't follow suit though. Executive vice president David Harris confirmed: "Categorically, we won't raise prices. We supply the masses and just because a product is in high demand today doesn't mean it will be tomorrow."

for the COMMODORE 64

BIG G

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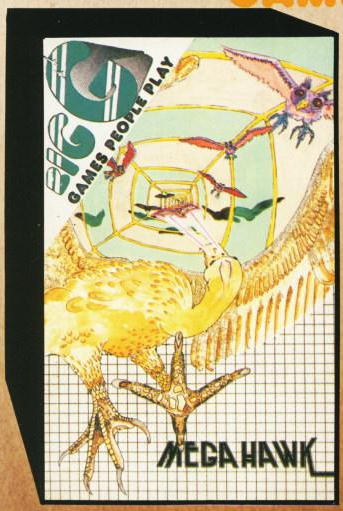


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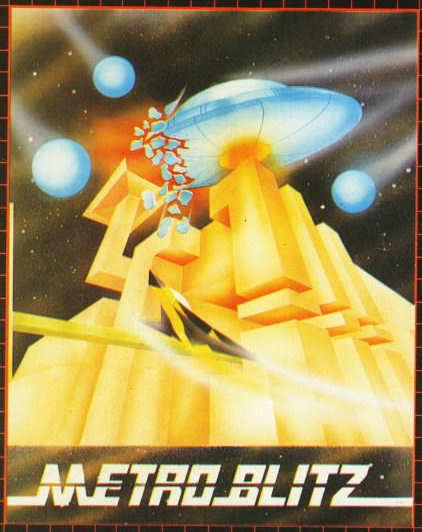


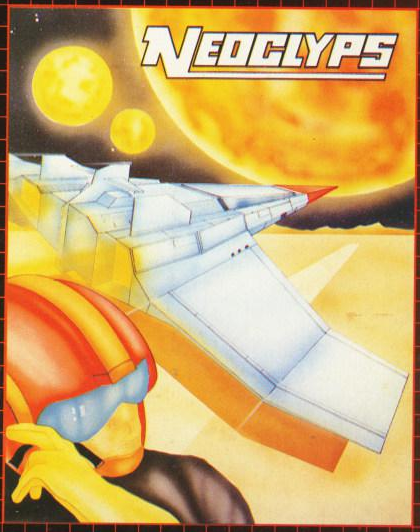


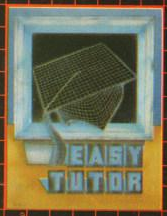

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